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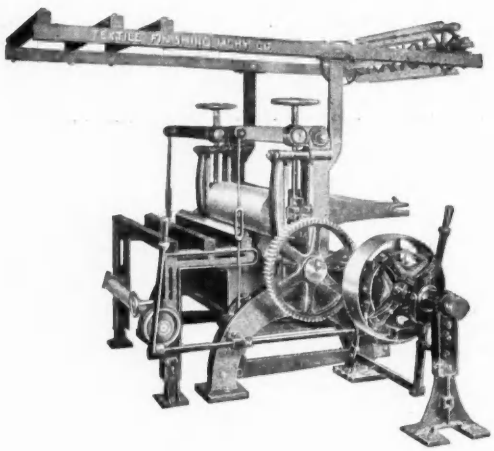

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These textile fibres were processed in the ordinary water supply of a well known mill. Under the microscope note the sticky deposits clinging to the fibres. In the finished goods these deposits will show up as a defect. (From an unretouched photograph.)

These textile fibres are exact duplicates of those to the left, except that they were processed in Permutit conditioned water. Note how smooth and clean the fibres are. (From an unretouched photograph.)

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HAS it ever occurred to you that water is your biggest raw material—that it should be studied and examined for impurities just as you inspect other raw materials.

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Think for a minute of the course water takes before reaching your mill, and you will see why this is true. Water is the greatest solvent in the world. When it falls on the earth as rain, it soaks into the ground. It runs over earth, rocks, minerals and decomposing vegetable matter. It flows into rivers, lakes and streams. Eventually, it reaches your plant.

But in its course your water supply has dissolved and carried along many substances that have no place in textile manufacturing. Substances that easily upset the delicate chemical and physical balance of your operations. You may go along for years without suspecting the presence of these substances, or the true cause of many production difficulties. Just as did the mill that sent us the two photomicrographs above.

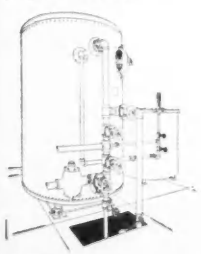
This mill is nationally known. For years it had about the same number of rejections and troubles as other mills. Finally it consulted the Permutit Company, water conditioning specialists, with the result shown in the photographs above.

That to the left shows textile fibers treated in the mill's ordinary water supply. The sticky lime deposits clinging to the fibres were deposited there by the water. They will show up as a defective spot in the finished goods. After Permutit water conditioning apparatus was installed, the fibres came through clean and smooth as you see them on the right.

The installation of this water conditioning apparatus has saved this mill thousands of dollars. It has cut down rejections. It has improved the quality of the mill's output. It has eliminated many of the troublesome little production difficulties that most mills have. These savings are not confined to this one mill. They have been repeated in hundreds of mills all over the country that studied their water supply and installed the proper water conditioning equipment.

How about your own water supply? Are you sure your water contains no harmful impurities? Even when you have analyzed your water and know it is all right today, that is no sign you can depend upon it a month from now. The complexion of water is never stable. A heavy rain or a drought may change its physical make-up completely.

You should have a copy of our booklet, "Reducing Textile Costs and Troubles." It goes fully into the subject of textile mill water supply from the standpoint of what the experience of other mills has been. Send for a free copy to-day, there is no obligation.



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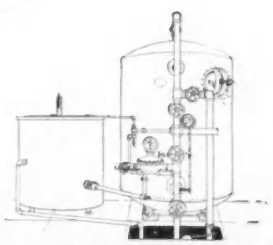

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But prior to 1882, both men had built dyeing machines for their own use and it was the clash of their ideas in the Patent Office that induced them to go into business together and incorporate the present concern.

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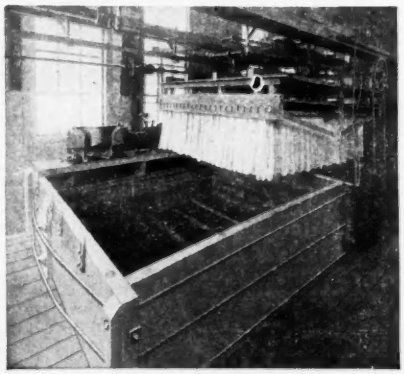

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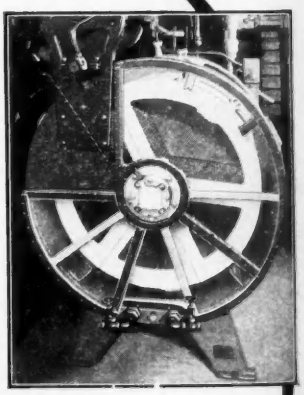

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VOLUME XIV NEW YORK, AUGUST 10, 1925 NUMBER 13

Dyeing Acetate Silk

Part XI

(*Continued from page* 511)

The Dispersal or Colloidal Solubilization Method of Dyeing Acetate Silk—Methods for Dyeing Celanese and Lustron with SRA Dyes in Solid Shades and Two-Color Effects—Formulas for Celanese-Lustron Union Dyeing

By CHARLES E. MULLIN, M.Sc., F.A.I.C.

(*All rights reserved by author*)

ANOTHER new method of dyeing this unique fiber is the dispersal process. This process and the products applied by it were developed after the Ionamines were upon the market and is the result of considerable research and experience in dyeing Celanese by its manufacturers and others, in their search for dyestuffs adaptable to, or special methods of application particularly suited for acetate silk.

The previous installments of this paper have repeatedly pointed out the affinity of acetate silk for a large number of dyes, bases, etc., which were insoluble or practically insoluble in water. In fact, in the case of *o*-tolueneazo-*o*-tolueneazo-*B*-naphthol (Spirit Red III) it has been shown that the dyestuff in solution has no affinity for acetate silk, while in an aqueous dispersion, such as results from pouring its alcoholic solution into water, it dyes acetate silk. The special class of dyestuffs prepared for dyeing acetate silk by the dispersal method are water insoluble products which are used as dispersions, i. e., as suspensions or colloidal solutions. Numerous references to products which may be applied in this manner are contained in the foregoing discussion of the various products which have been used in dyeing acetate silk.

Experimental work with the various products applicable to acetate silk developed, according to Dr. C. Holland Ellis, a few rules very similar to those which led to the development of the Ionamines. (*a*) That the substantive affinity of dyestuffs for acetate silk is roughly proportional to the basicity of the dye or inversely proportional to its acidity, i. e., the salt forming power with bases. (*b*) That the affinity is also proportional to the molecular simplicity of the dye. These rules readily explain the high dyeing powers of the basic dyes, many azo compounds and simple amino bases, as well as the non-dyeing properties of the most acid and direct cotton dyes.

These rules, after much research, led to the development of the new class of dyestuffs and method of dyeing acetate silk. It is a question just how many of the products used in this manner are really new compounds, but it is certain that the method of application is new. In other words, it is possible that some or perhaps many of these dyes are more or less well known compounds, which are comparatively insoluble in water and other common solvents, but the physical method of solubilizing them for application to acetate silk is new. While these dyes were developed for acetate silk no doubt many of them, or other insoluble products, are applicable by this or a similar process to other fibers. In fact, most of the products now in use stain or dye wool and real silk, so that the discovery of these products may have considerable bearing on the dyeing processes of the future.

In developing the original dyes in this field, the SRA dyes, it was found that many comparatively water insoluble commercial dyestuffs, bases, etc., as well as some new insoluble dyes, were soluble in highly sulphonated castor oil or concentrated *SulfoRicinoleic Acid* (from which the SRA dyes receive their name), some of them apparently forming salts with the acid which were soluble in excess of the solvent (acid), as in the case of SRA Orange I. Most of them are also soluble in many other oleaginous compounds of salt forming characteristics, such as the higher fatty acids and their salts, resorcinol, cresols, sulphonic and carboxylic acids of benzene, naphthalene, etc., as well as in many other organic compounds; and apparently in the case of the Duranol and Azonine dyes, some such other solvent compound is used in place

of the sulforicinoleic acid. When once they are in solution, the solvent solution of dye may be placed directly in the dye bath without precipitating the dyestuff. It appears to remain in (colloidal) solution when the dye bath is neutralized or even made alkaline. Under such conditions the dyestuffs give practically clear transparent solutions, pass through filter paper, and are readily absorbed by acetate silk.

In this manner it was found possible to dissolve and apply such insoluble products as the following to acetate silk: Nitrobenzeneazobenzene 2-naphthol (Sudan III); benzeneazodimethylaniline (Oil Yellow D); *m*-nitrobenzeneazodiphenylamine; nitrobenzeneazo-2-naphthol (Para Red); 4-nitro-2-methoxybenzene-1-azodiphenylamine; *p*-acetamidobenzeneazo-1-naphthylamine; *p*-aminobenzeneazonaphthaleneazodimethylaniline; aminoazonaphthalene; *p*-aminobenzeneazophenylmethylpyrazolone; dimethyl-*p*-amino-phenyl-1, 4-naphthoquinonimine (Indophenol Blue); 1-aminoanthraquinone (Yellow); 2-aminoanthraquinone; 1-*p*-tolylamino-4-hydroxanthraquinone; Rosaniline base; Safranine base; Methylene Blue base; *p*-nitroaniline; benzidine; dianisidine; aminoazotoluene; di-*p*-methoxybenzoyldiaminoanthrarufin; tetramethyldiamidotriphenylcarbinol; *p*-nitrobenzeneazodiphenylamine (orange); benzeneazonaphthaleneazophenol (gold); diethyl-*p*-amidophenyl-1, 4-naphthoquinonemonoimide (blue); triaminotriphenylcarbinol; 1-benzoylamino-4-hydroxyanthraquinone (Algol Pink R); 6, 6-dichloro-2, 7-di-*a*-anthraquinonyldiaminoanthraquinone (Indanthrene Bordeaux B); as well as a host of other more or less similar products.

At present there are available in the SRA dyes direct dyeing shades ranging from lemon, yellow, tangerine, scarlet red and violet to blue. There are also several diazotizing colors, called Diazo Solamines, which give very deep shades on acetate silk, two of which are black. It is claimed that dyeing acetate silk by the dispersal method is no more expensive and in some cases cheaper, than dyeing cotton or other artificial silks with colors of equal fastness. They have been used in England for possibly three years and several million pounds of Celanese have been dyed in this manner. The SRA dyes are controlled by the manufacturers of Celanese who allow them to be used only upon their product, Celanese. However, the Duranol, Celatene and Azonine dyes are sold without restriction regarding their use and give very similar results on Lustron and Celanese.

In fact, nearly all substances capable of dyeing acetate silk may be applied to some extent by means of a dispersing agent. However, dyes having no direct affinity for the fiber, such as most direct and certain sulphonated acid dyes, cannot be applied by this method. It is interesting to note that most dyes upon acetate silk conform more closely to simple rules governing the relationship of their chemical structure to their resistances to acids, alkalies and light than is the case with any other fiber. Most of dispersal dyes marketed have an excellent fastness to the above as well as to soaping, ironing, volatility, perspiration, rubbing, phototropy, cross dyeing of cotton or wool, domestic usage, weathering, etc.

In working out these dyes, the matter of phototropy again came into prominence. This difficulty was discussed in connection with the development of the Ionamines. This rather newly recognized defect of dyes appears to be particularly common in the case of yellow and orange azo and aminoazo dyes on acetate silk, especially in the greenish-yellows. While the exact constitution of the various SRA dyes has not been divulged, a review of the patent literature indicates that some of them are simple azo and aminoazo compounds, possibly the yellows, oranges and reds, while some or perhaps most of the violets and blues are of the anthraquinone series. Some of these are soluble in cold Turkey Red oil, etc., while others require heating.

Method No. 77: The SRA Dyes on Celanese.—At the present time the SRA dyes are marketed as 10 per cent pastes of the dyestuffs in the solubilizing medium, and can be placed directly in the hot aqueous soapy or alkaline (ammoniacal) dye bath without any further treatment. They are applied by the usual direct dyeing methods, preferably in soapy dye baths as an aid to penetration and leveling. Many of them may be applied cold without sacrificing fastness. They do not stain cotton or other artificial silks, and may be mixed indiscriminately together, or may be applied in the same dye bath with suitable direct cotton dyes, despite the apparent chemical incompatibility of the two groups. Sodium chloride or sulphate may be used in moderation to assist the cotton dye, but does not benefit the dispersal dyes materially except for heavy shades, and it must not be present in sufficient quantity to cause salting out of the soap, or to cause a precipitation of dye which may be superficially fixed on the fiber, and cause crocking.

About one to one and a half grams of olive oil soap per liter of dye bath is usually added, or one or two c.c. of Turkey Red oil per liter may be used for pale shades, or to aid penetration. On goods of heavy or tight construction a lower temperature may be used for a longer time to insure penetration. It is also best to dye pale shades at a low temperature to insure evenness. In dissolving or rather diluting the dye pastes, it is best to add a fairly strong hot soap solution to the dye paste and then dilute this with hot water. Bring this to the boil and add it to the dye bath containing the balance of the soap.

Most of the dye baths are clear but a few are cloudy, even when heated. The most stable solutions appear to be those prepared cold and heated afterward, instead of preparing the dye bath very hot. Some SRA dye baths are so stable as to permit standing for several days without precipitation, but others will not. Most of these products dye level and very fast. As they are used in soapy baths, soft water is very essential for their successful application, and copper dye vessels may be used. A twenty-five to one dye bath is generally used for skeins and a thirty or thirty-five to one bath for piece goods, but this may be varied according to the type of vat or machine used. After dyeing with the dispersal dyes the

material should be rinsed and soaped as directed in the formulas given.

The following is a list of the present SRA dyes, with the resulting shades:

SRA Pure Yellow I	Lemon
SRA Pure Yellow II	Greenish Lemon
SRA Golden Yellow VIII	Daffodil
SRA Golden Yellow IX	Old Yellow
SRA Golden Orange I	Marigold
SRA Orange I	Tangerine
SRA Red I	Scarlet Red
SRA Red III	Crimson Red
SRA Red V	Violet Red
SRA Heliotrope I	Bright Heliotrope
SRA Violet II	Brilliant Bluish Violet
SRA Blue III	Reddish Blue
SRA Blue IV	Pure Sky Blue
SRA Blue V	Deep Blue
SRA Black III	Bluish Black
SRA Black IV	Full Bluish Black

SRA Black III is the older of the two blacks and gives a good black color when developed with *B*-hydroxynaphthoic acid. Black IV is a newer dye, is extremely fast and gives a full black with *B*-hydroxynaphthoic acid. Since it also gives a good black with *m*-toluylenediamine, it is very suitable for use in dyeing acetate silk-cotton hosiery. It may be dyed in the same dyebath with a diazotizable cotton black, to give a solid black shade upon development.

All of the above are direct colors, while the following shades may be obtained from the SRA Diazo Solamines by diazotizing and developing with Naphthol AS, dimethylaniline or *B*-hydroxynaphthoric acid. Resorcin and *B*-naphthol are also used and doubtless many others may have special uses for certain purposes.

SRA Diazo Solamine I—Developed with

(a) Naphthol AS	Nigger Brown
(b) Dimethylaniline	Garnet
(c) *B*-Hydroxynaphthoic Acid	Deep Greenish Navy

SRA Diazo Solamine II—Developed with

(d) Naphthol AS	Puce
(e) Dimethylaniline	Maroon
(f) *B*-Hydroxynaphthoic Acid	Navy and Black

SRA Diazo Solamine III—Developed with

(g) Naphthol AS	Navy
(h) Dimethylaniline	Reddish Rust
(i) *B*-Hydroxynaphthoic Acid	Black

The combinations *a*, *f*, *g* and *i* are more generally used than the others. As *B*-hydroxynaphthoic acid as a rule gives shades which are sensitive to acids and alkalies, it is generally used only for blacks, as in *f* and *i*, preferably the latter. The development methods are somewhat different from those employed in developing the cotton colors, and in some cases formic acid, formaldehyde and glue, as well as sodium chloride or zinc nitrate are employed in the developing bath.

Many silk and wool dyes which may be applied in a neutral bath may also be used in the same dye bath with the dispersal dyes. With the exception of SRA Pure Yellow I which dyes animal fibers, the SRA dyes do not completely dye the animal fibers; however, some varieties of silk stain more than others and wool is stained. Soaping after dyeing as in Methods No. 33 and No. 34 removes any particles of dye adhering to the undyed fibers.

The cotton, wool or silk may be cross dyed after dyeing the acetate silk, but in case acid is used in cross-dyeing, it is best to substitute acetic or formic acid for sulphuric acid. In cross-dyeing cotton-acetate silk unions with dispersal dyes it is always best to dye the acetate silk first and then the cotton, as the dispersal dyes withstand cross-dyeing much better than do most cotton dyes. The dispersal dyes are applied to piece goods in the winch or the jig, and in the hank by hand or on the various machines, no special machinery being required. As a class they are not usually sensitive to copper or most other metals.

The following formulas for the SRA dyes will illustrate their use:

Formula No. A1—Tangerine

4 per cent SRA Orange I paste (10 per cent),
0.7 per cent SRA Red I paste (10).
Enter cold and dye at 60 deg. Cent. (140 deg. Fahr.) for one hour.

Formula No. A2—Gold

7 to 10 per cent SRA Golden Yellow VIII paste.
Enter cold and dye at 70 to 80 deg. Cent. (158 to 178 deg. Fahr.) for one hour.

Formula No. A3—Gray

2 per cent SRA Blue III paste.
0.3 per cent SRA Golden Orange VIII paste.
0.15 per cent SRA Orange I paste.
Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one hour.

Formula No. A4—Gray

0.75 per cent SRA Pure Yellow I paste.
3.50 per cent SRA Blue I paste.
0.75 per cent SRA Orange I paste.
Enter cold and dye at 60 deg. Cent. (140 deg. Fahr.) for one hour.

Formula No. A5—Putty

3 per cent SRA Blue II paste.
0.2 per cent SRA Orange I paste,
1.5 per cent SRA Golden Orange VIII paste.
Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one hour.

Formula No. A6—Brown

8 per cent SRA Blue III paste,
8 per cent SRA Orange I paste,
2 per cent SRA Golden Yellow VIII paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and three-quarters hours.

Formula No. A7—Brown

3 per cent SRA Red I paste,
10 per cent SRA Blue I paste,
20 per cent SRA Golden Orange VIII paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hours.

Formula No. A8—Royal

8.0 per cent SRA Blue V paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour.

Formula No. A9—Dull Green

3.0 per cent SRA Blue II paste,
8.0 per ccent SRA Pure Yellow L paste.

Enter cold and dye at 70 to 75 deg. Cent. (158 to 167 deg. Fahr.) for one hour.

Formula No. A10—Violet

8 per cent SRA Blue I paste,
8 per cent SRA Red V paste.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one and one-half hours.

Method No. 78: Solid Shades on Celanese-Cotton Unions.—In dyeing solid shades on acetate silk-cotton or acetate silk-artificial silk unions, it is best to add all the dispersal dye to the bath at the start and then half the substantive dye, adding the balance of the cotton dye at a high temperature, the salt being added in portions. The following formulas are recommended for solid shades in fifty-fifty unions:

Formula No. U1—Brown

6 per cent SRA Blue III paste,
2 per cent SRA Golden Orange VIII paste,
2 per cent SRA Orange I paste,
1.20 per cent Chlorazol Brown RD,
0.15 per cent Chlorazol Brown RK and
15 per cent of salt.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-half hours.

Formula No. U2—Light Brown

10 per cent SRA Blue I paste,
2 per cent SRA Orange I paste,
2 per cent SRA Pure Yellow I paste,
1.20 per cent Chlorazol Brown RD,
0.15 per cent Chlorazol Brown RK, and
20 per cent of salt.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-half hours.

Formula No. U3—Field Gray

3 per cent SRA Blue I paste,
0.35 per cent SRA Orange I paste,
0.75 per cent SRA Pure Yellow paste,
0.25 per cent CR Chlorazol Black GF,
0.05 per cent Chlorazol Brown RK, and
15 per cent of salt.

Enter cold and dry at 75 deg. Cent. (167 deg. Fahr.) for one and one-half hours.

Formula No. U4—Solid Scarlet

5 per cent SRA Red I paste,
1.25 per cent CR Chlorazol Fast Scarlet 4BS, and
10 per cent salt.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one and one-half hours.

Formula No. U5—Fawn

2 per cent SRA Blue I paste,
0.50 per cent SRA Orange I paste,
1 per cent SRA Pure Yellow I paste,
0.20 per cent CR Chlorazol Drab RH,
0.10 per cent Chlorazol Brown RK, and
15 per cent of salt.

Enter cold and dye at 65 deg. Cent. (149 deg. Fahr.) for one and one-quarter hour.

Formula No. U6—Light Blue

2 per cent SRA Blue II paste,
0.05 per cent SRA Pure Yellow L paste,
0.30 per cent CR Chlorazol Sky Blue FF, and
10 per cent of salt.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one and one-half hours.

Formula No. U7—Apple Green

0.40 per cent SRA Blue II paste,
1.00 per cent SRA Pure Yellow I paste,
0.05 per cent CR Chlorazol Sky Blue FF,
0.125 per cent CR Chlorazol Fast Yellow FG, and
5 per cent of salt.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one hour.

Method No. 79: Two-Color Effects on Celanese-Cotton Unions.—Very good two-color effects on acetate silk-cotton or artificial silk unions may be obtained by dyeing the union in a bath containing about 0.5 grams per liter of olive oil soap and the SRA dye, adding the cotton dye as the temperature is raised and finally adding salt to aid the exhaustion of the cotton dye. The goods should be entered cold and the temperature slowly raised to about 80 deg. Cent. (176 deg. Fahr) for one to one and one-half hours, or until the desired shade is ob-

tained. The following formulas are typical of the processes recommended for fifty-fifty Celanese-cotton or artificial silk unions.

Formula No. U8—Celanese, Flame, Cotton or Artificial Silk Gray

0.30 per cent CR Chlorazol Fast Gray,
2.00 per cent SRA Orange I paste,
0.50 per cent SRA Pure Yellow I paste, and
10 per cent of salt.

Formula No. U9—Celanese Deep Saxe, Cotton Gray

0.30 per cent CR Chlorazol Fast Gray,
5.00 per cent SRA Blue II paste, and
10 per cent of salt.

Formula No. U10—Celanese Crimson, Cotton Saxe

1 per cent CR Chlorazol Fast Blue 2B,
6 per cent SRA Red III paste,
1.20 per cent SRA Red V paste, and
20 per cent salt.

Formula No. U11—Celanese Royal, Cotton Rose

0.25 per cent CR Chlorazol Fast Red K,
8 per cent SRA Blue I paste, and
10 per cent of salt.

Formula No. U12—Celanese Cherry, Cotton Green

2.50 per cent CR Chlorazol Fast Green,
7.58 per cent SRA Red V paste, and
20 per cent of salt.

Formula No. U13—Celanese Violet, Cotton Green

2.50 per cent CR Chlorazol Fast Green,
4 per cent SRA Blue I paste, and
4 per cent SRA Red V paste.

Formula No. U14—Celanese Brick, Cotton Gray

0.30 per cent CR Chlorazol Fast Gray,
0.25 per cent SRA Orange I paste,
0.25 per cent SRA Red I paste, and
10 per cent of salt.

Formula No. U15—Celanese Lemon, Cotton Amethyst

0.20 per cent CR Chlorazol Fast Blue 2B,
0.80 per cent CR Chlorazol Violet R,
1 per cent SRA Pure Yellow I paste, and
10 per cent of salt.

Formula No. U16—Celanese Bronze, Cotton Green

2.50 per cent CR Chlorazol Fast Green,
2.50 per cent SRA Blue I paste,
1.50 per cent SRA Orange I paste,
3 per cent SRA Pure Yellow I paste, and
20 per cent of salt.

Formula No. U17—Celanese Orchid, Cotton Sky

0.25 per cent CR Chlorazol Sky Blue FF,
1 per cent SRA Red V paste, and
10 per cent of salt.

Formula No. U18—Celanese Reseda, Cotton Brown

2.50 per cent CR Chlorazol Fast Brown No. 1,
1.50 per cent SRA Blue II paste,
4 per cent SRA Pure Yellow I paste, and
20 per cent of salt.

Method No. 80: Topping the SRA Dyes.—The dispersal dyes may be topped with basic dyes in the same manner as the substantive dyes are topped on cotton. Another method of topping which is particularly adapted for use in applying the dispersal dyes is to dissolve the free color base of the common basic dyes, such as Rosaniline Base, Methyl Violet Base, Safranine Base, Quinoline Yellow, Indophenol, etc., in Turkey Red oil. This solution may be added to the dye bath containing the dispersal dye and applied concurrently with it. This, of course, avoids a separate topping operation.

(Part XII will appear in an early issue)

SODIUM PEROXIDE AS A BLEACHING AGENT

IN recent years sodium peroxide has risen to considerably greater importance than used to be the case not many years ago. There is, however, not a great deal in our technical literature devoted to the use and great value which this bleaching agent may justifiably claim. A writer in the "Textilberichte," Dr. J. Pfleger recently drew attention to the lack of attention which writers had appeared to give to this compound, which was capable of ousting many other of our long-established bleaching compounds as a better proposition commercially.

For some time now sodium peroxide has found favor as a bleaching agent for animal fibrous materials, such as silk, wool, feathers, etc., but for cotton it has not met with the attention it deserves. The insufficient technical treatment which oxygen bleaching processes have received in the past, says the above writer, is illustrated by the fact that our literature has habitually given inferior or old recipes which have long ago fallen into disuse. This is seen in the case of the use of Epsom salts for neutralizing sodium peroxide which is a method always given in recipes although now quite a back number.

Useful Literature

Some of our progressive makers of technical products are now supplying in their pamphlets and booklets some very interesting and instructive discussions of their manufactured products which are to some extent filling the gaps in our technical literature, and among the small books which the Castner-Kellner Company have recently sent out is a very useful one on sodium peroxide, its

history, properties, uses and methods for the best way of applying as a bleaching agent.

Used for animal fibers, it has the advantageous property of being permanent in its results, unlike the sulphur bleaching compounds which are so readily oxidized back to their original state.

Keeping Peroxide Stable

In the above pamphlet it is pointed out that the commercial article, either coarse or fine-ground, has an available oxygen content of just over 19 per cent and it contains a very small amount of sodium phosphate which is added for the purpose of stabilizing the hydrogen peroxide bath.

The compound must be stored very carefully and organic substances such as paper, wood, etc., must not be allowed to come into contact with it, since in the presence of moisture such as may be present in the air, sodium peroxide is highly combustible, and will explode with violence once it has been ignited in this way.

Sodium peroxide quickly dissolves in water with liberation of heat, but the solution so produced is strongly alkaline and must be neutralized, particularly where animal fibers are being treated. Sulphuric acid or hydrochloric acid may be used for this purpose by adding to the water, before the peroxide is added, sufficient to neutralize the alkalinity produced. Pure hydrochloric acid is recommended, free from iron, which must not be present. Another important point which makes hydrochloric acid preferable is that the heat of reaction is only about two-thirds that evolved when using sulphuric acid.

When the bleaching process is about to begin it is necessary to make the slightly acid peroxide solution slightly alkaline, and for this purpose ammonia, tri-sodium phosphate, silicate of soda and sodium peroxide have been recommended, the sodium silicate probably being the best for the purpose provided the acidity to be corrected is small.

A point mentioned in the pamphlet which is somewhat different to the old procedure is that in the past bleachers have been recommended not to wash out the soap which is in the goods after scouring, since soap has a beneficial effect in peroxide bleaching, but it is now advised that all soap be removed, since an excess of soap may find its way into the bleach liquor with disadvantageous results. It is also pointed out that at one time sodium phosphate was suggested as a suitable addition to make to the bleaching bath in order to give stabilization, but as it is added to the sodium peroxide supplied for bleaching further addition is unnecessary.

Temperature of Liquor

Before the actual bleaching operation itself is started it is essential that all classes of goods are thoroughly cleansed and the temperature of the liquors should be carefully watched; for woolen materials 40 deg. Cent. should not be exceeded, and although other materials may go slightly higher it is not advisable to have too hot liquors. An interesting point which may have been observed by those engaged in the bleaching of wool with these compounds is mentioned in the development of a pinkish stain or cast during the bleaching, and this is probably due to processing at too high a temperature or pressing the bleaching too hard.

With reference to the type of plant used it is necessary that no metals come into contact with the peroxide solution since this may cause rapid decomposition of the solution with a possibility of the production of stains. White hard wood is generally recommended for the construction of the bleaching vats.—Yorkshire Evening Argus Textile Supplement.

1926 CHEMICAL EQUIPMENT EXPOSITION TO BE HELD IN CLEVELAND

The Association of Chemical Equipment Manufacturers has announced that its Second Chemical Equipment Exposition will be held in the $6,000,000 Public Hall in Cleveland from May 10 to 15, inclusive, 1926.

The exposition will follow the general lines of the recent First Chemical Equipment Exposition of the association held in Providence, which, the association has previously stated, successfully fulfilled the organization's expectations.

Displays will be confined to equipment, supplies, accessories and materials essential to the processing industries. It will not include manufactured chemical products.

Attendance will be limited to technical and industrial men, including all ranks of industrial employees, and technical educators and students.

WOOL CONSUMPTION HAS INCREASED

Wool imported into the United States approximated 130 million dollars in value in the fiscal year just ended despite the fact that the number of sheep in this country exceeds that of any other except China and Australia. Our wool consumption, says the Trade Record of the National City Bank of New York, continues in excess of pre-war years, having aggregated 538 million pounds in 1924 against an annual average of approximately 500 million pounds in the decade preceding the war.

The New Bedford Textile Corporation has been formed at New Bedford, Mass., to carry on the business of cotton doublers, weavers, spinners, cotton merchants, yarn merchants, silk manufacturers, bleachers and dyers and to purchase, comb, prepare, spin and deal in cotton, silk and other fibrous substances, and to weave and otherwise manufacture cloth, handling, other goods and fabrics, whether textile, netted or looped.

Safety in the Design of Chemical Plants*

The Investment—The Industry—The Process—Location—Type of Construction—Control—Power Distribution—Waste and By-product Disposal—Sanitation—Hazards and Insurance—Storage—Design

By W. H. KILER

PLANT design covers structural engineering, machine design, power engineering and is a problem of co-ordination of all of the features of the various branches of engineering into a whole.

The safety engineer takes a plant as it exists and analyzes each operation, following the operation through from the beginning to end to look for possible sources of trouble or hazards of occupation. Consequently he is in possession of facts dealing directly with the installation of apparatus and with the design of plants with which the designing engineer is unfamiliar. Therefore, the safety engineer and designing engineer should work together in very close harmony from the time the plans for a new plant are first conceived until they are finally executed.

The designing engineer devotes his time and study to the problems of how best to make use of the various arts. It is safe to claim that the average designing engineer does not hear of 90 per cent of the minor plant injuries caused by very small features of design and layout which are easily correctable. It is essential that the designer be thoroughly familiar with all details within the field which his design is to cover and that he give a large amount of study to the general subject and consult with specialists in the various lines involved.

There are four basic subjects applying to all problems of plant design which should be thoroughly analyzed and studied before any attempt is made to formulate definite plans, and safety ties in very closely with all of them. They are:

1. The Investment.
2. The Industry.
3. The Process.
4. The Location.

The Investment

All plants are designed to operate at a predetermined rate, and more important still, all processes have a minimum rate at which they can be operated economically and safely; so that, basically, the proposed rate of manufacture and the maximum and minimum rates should be determined and set up as guides for all future decisions.

The primary object of any plant is to return earnings upon a certain investment without undue risk. Having the rate of manufacture and the maximum and minimum rates, the engineer can, with the help of his company's cost division, estimate the minimum earnings and thereby determine the maximum investment.

If the rate of return will justify it, and the need for the product is sufficiently stable, most certainly the design to be chosen is of the type which, while higher in first cost, will show decreased maintenance costs over a period of years. On the other hand, the return may be so low that the design chosen must necessarily have the lowest first cost and perhaps subsequent higher maintenance cost, in which event, the risks involved are liable to be much greater.

The Industry

To most of us employed by large corporations, our design problems are along lines with which we are usually intimately familiar. If our problem is for an industry with which we have been associated, we select from all available data the best types of construction and arrangement.

Successful practice is soon common knowledge. Mistakes in operating control or operating practices are readily corrected. A mistake in original design of construction making for unsafe operating conditions or high costs stands out as a constant reminder of the error, unless corrected—many times at great expense.

Modern chemical engineering methods have become so standardized that, given complete knowledge of all the chemical and physical constants and the characteristics of the materials and products, the designer can select known unit processes best fitted. If the constants and the characteristics are not known, they should be accurately determined before any design work is done.

The Process

There are five types of processes involved in any chemical operation, namely:

1. Transporting
2. Energizing
3. Reacting
4. Separating
5. Conditioning

These five types can be divided into innumerable subdivisions. For example:

*Read before the Chemical Safety Conference, Wilmington, Del.

Transportation

Railways	Loading
Tramways	Unloading
Cableways	Machinery
Telpherages	Pipes
Canals	Pumps
Drags	Ditches
Elevators	Flumes
Conveyors	Conduits
Chutes	Conductors

Energizing

Heating equipment	Exchangers
Cooling equipment	

Reacting

Vats	Retorts
Tanks	Roadsters
Cells	Converters
Combustion Chambers	

Separating

Skimmers	Sizers
Sifters	Filters
Settlers	Dewaterers
Separators	Centrifuges
Coolers	Strainers
Dryers	Extractors
Evaporators	Flotation Apparatus
Stills	Wet Tables
Presses	Precipitators

Conditioning

Grinders	Mixers
Crushers	Digesters
Shredders	Atomizers
Rolls	Compressors

Location

The location of the plant should be considered under three general headings—geographic, topographic and economic.

The geographic location will largely affect the materials of construction. The designer must allow for excessive rainfall, snow, ice, humidity, heat, wind, and other physical features imposed by climate.

For example: A building constructed in our Northern States must have ample provision for snow loading, must be provided with ice breakers on the roof, for protection against the forming of icicles over passageways, as well as for ample rain gutters and leaders.

The same process in the Southern States would indicate a different type of building construction as being most economical. No protection will be needed against snow or ice, but provision must be made for extreme rainfalls, and in many cases for windstorms.

At one of our Southern plants, we have provided for wind loads at a velocity of 65 miles per hour. It has run up our column, purlin and girt costs considerably but we have found it cheaper to take these costs than to take the risks involved by a weaker structure.

Likewise, the direction of prevailing winds should be studied so that fire doors of boilers and furnaces and doors of all chambers where hot or finely divided materials are handled, should be placed to leeward.

Relative humidity should be carefully considered. Where processes are affected by humidity and 24-hour operation is necessary, it may be advisable to resort to artificial conditioning of air. Likewise, the exposure of operators to excessive temperatures, dusts, etc., and protection against such hazards must be given every consideration.

The Economic Location.—Is determined by the supply of materials, of power and labor; by markets and competition. The explosives plants should economically be located close to the consumers of their products because of the high freight rates on explosives. They cannot ordinarily be located adjacent to the source of raw materials or power. In consequence, ample provision must be made for the storage of raw ingredients, and where purchased power is not available, provisions must be made for the generation of power and ample fuel storage provided.

In other chemical industries, however, it is possible to locate close to consumers where ample power is available and no provision need be made for excessive storage of raw ingredients or for fuel. Where raw ingredients are brought into the plant or finished product shipped out in cargo lots, facilities for water transportation are of paramount importance. Where raw ingredients or finished product are shipped inward and outward in less than cargo lots, rail location is much to be preferred.

Topographic Location.—The construction cost and efficiency of transportation systems conveying material into, through and away from the plant depends upon the skillful use of topographic features. The designer must consider whether the "hillside" type is superior or whether the "flat type" is best. It is most generally assumed the "hillside" or "gravity" type plant is superior, whether actually located on a hillside or whether the gravity conditions are brought about by multi-story design and construction. Gravity flow often considerably reduces the risks, because less power driven machinery and pressures apparatus, such as blow cases, are needed.

To systematize the study of details, further subdivisions are necessary, in each of which safety is closely allied, such as:

1. Type of construction.
2. Separately associated units or single unit types.
3. Control which may be further divided as:
   - Administrative
   - Labor
   - Time
   - Material
   - Chemical
   - Light

4. Power Distribution.
5. Waste and By-Product Disposal.
6. Sanitation
7. Hazards and Insurance.
8. Storage.
9. Drafting and Design.

Type of Construction

The manufacture of naval stores is by steam and solvent distillation. The manufacture of explosives requires nitric and sulphuric acids. In explosives industries there are but two main types of construction to be considered, namely, wood frame and steel frame. These may be further subdivided:

Wood Frame

With wood walls.
With metal walls.
With masonry walls.

Steel Frame

With wood walls.
With metal walls.
With masonry (brick or tile) walls.
With concrete walls.

Under each of these subdivisions, the roof is considered separately, namely:

Wood roof—plain.
Wood sheathing covered with composition roofing.
Metal roof—tin, zinc, aluminum, corrugated iron.
Asbestos roof—asbestos shingles on wood sheathing, corrugated asbestos on wood purlins; asbestos shingles on wood sheathing, corrugated asbestos on steel purlins.
Pre-cast concrete slabs.

The type of construction depends upon factors which must be scrutinized carefully, each building upon its own merits, considering the safe operation of the process involved, the investment and the location. For example, in sulphuric acid manufacture using the Schroeder contact process, where there are no excessive fumes, the decision between wood frame or steel frame will be based upon the question of cost and safety, and the designer may proceed using the same factors for strengths of materials as in any other chemical manufacturing operation.

In sulphuric acid concentration where exccessive fumes are liberated, the problem must be approached from a different angle. If the plant is located geographically where humidity is not a factor, a steel frame building is warranted; but, if humidity is a factor, the corrosion rate on a steel frame building makes that type impracticable, and wood frame must be resorted to. In this type of process, we reduce our fiber stress to 500 pounds which materially affects the cost and type of construction and provides what is considered an ample factor of safety.

Separately Associated Units or Single Unit Types.—Where the process requires a large amount of transportation, the location of buildings must conform to the flow sheet. Where control or conditioning of materials is of imporance, it may be good design to arrest or even reverse the flow under certain conditions. Therefore, most careful study of the influence of all units must be made before a definite location is decided upon. The explosives industries are further complicated by maintaining distances between operating units suitable for the amount of explosives under process in each of the individual units. These distances are based not only upon the amounts of explosives in the buildings, but whether or not the buildings are effectively screened or barricaded, one from the other. In some instances, we have as much as 1,200 feet between units. The distancing of buildings also applies to distances from public highways, railroads and other property. Pressure apparatus should, in many instances, be treated the same as quantities of explosives in process.

The designer must watch to see that he has not tied the individual units too closely, especially where explosion hazards are involved, and has provided sufficient intermediate storage between the more important steps of process to care for the surges in demand, or the emergency curtailment of production during break-down periods.

Control

Administrative.—Successful control is the keynote of success in design. Systems of close control cannot successfully be superimposed on existing plants. Original design must provide the elements which make control possible and not too expensive. Without proper control departmentalization is impossible and works cost accounting involved and inaccurate. With proper design, modern accounting becomes a real tool which may be used to lower costs and raise production without increase in hazard.

Labor.—The physical control of labor is best obtained by proper departmental supervision. The ideal would be to place the laborer at his task immediately after his time is chargeable to the company and to remove him from the premises promptly after he has ceased his task. This is rarely achieved, but good design will permit its practical realization. Good design will also provide proper dining and rest facilities, distribution of pure drinking water of proper temperature, wash rooms, change rooms or change houses, and toilet facilities sufficiently close to each department that close supervision may be exercised to reduce lost time due to improper arrangement of these facilities.

Time.—The control of time is next in importance to the control of labor. In many of the chemical industries, processes are largely controlled in time cycles. The free use of clocks, and even automatic timing devices is advisable. Where possible, a master clock controlling all clocks has proved very satisfactory. All processes may then be under the same centrally controlled time. The time element in controlling material in process is very frequently important to avoid dangerous conditions.

Material.—Control of materials may be either from the standpoint of volume or of weight. It is easily possible

to overdo in designing for the control of materials. For most accounting systems, the weighing of incoming ingredients, charging into process and weight of finished product is sufficient.

Chemical Control.—As recently defined, "indicates a service rather than a specific act; a service in which scientific chemical knowledge originating in the laboratory or plant and put into practice by both technical and non-technical men and women is used to increase the efficiency of practically every manufacturing process and the quality of every product."

From the designers' standpoint, chemical control can, for instance, be divided into the control of temperature, control of ingredients by analysis and weight, and the control of moisture.

Light.—We find it is better for the designer to control natural light by proper coloring of walls and ceilings, and by location and size of windows rather than to be obliged to make up for a deficiency in design by an elaborate artificial lighting system.

However, where 24-hour processes are encountered and artificial lighting is necessary, the designer has the present day standardization of lighting fixtures for his guide. Except for special classes of work requiring high concentration of light or the absence of shadows, the ordinary mazda lamp is used on account of its reliability and low cost.

The problem resolves itself into two elements: First, the angles, surfaces and distances from the object to be illuminated; second, the selection of proper lighting fixtures. In many installations, it is necessary to provide special illumination features pointing directly toward individual machines and apparatus, toward pressure gauges and similar measuring instruments requiring constant attention, and toward locations where materials are regularly handled.

Power Distribution.—The distribution of power, like all other factors in design, must be guided primarily by the type of process and after that by the limitations of layout or of flow. It is a mistake to warp any of these to fit an arbitrary scheme of power distribution. The ideal system of power distribution is the most elastic: however, it is necessary to consider several systems for distribution, namely:

1. The purchase of electrical energy.
2. Generation of electrical energy at a central station.
3. The necessity for generating steam for heating and process purposes and its relation to the cost of generating electrical energy.
4. Distribution of electrical energy to various motor drives.
5. Generation of mechanical power at a central station and distribution through the plant mechanically by means of line shafts.
6. The distribution and division of the prime movers themselves.

Safety principles and safe practices are of the utmost importance when considering the distribution of power and its relation to chemical plant design. There are infinite details which must be considered, especially in those processes where continuity of operation is of paramount importance.

Waste and By-Product Disposal

All material not included in the regular product of the plant, which is chemically or physically altered as a result of the plant processes, is either a by-product or a waste. If subject to ready disposal, the material becomes a by-product. Provision must be made for the storage and transportation of the by-product as if it were the main product. If there is no market for the material, it becomes a waste and design must adequately provide for the cheapest possible safe method of disposal.

In some processes the quantity of waste is tremendous and its disposal may become as serious a question to the designer as the design of the plant itself. If legal restrictions exist, adequate provisions may be taken to protect the industry; even to the extent of moving to a different location.

The question of sanitation must be considered first, from the effect of the plant on the health of the employees. From a purely business point of view, the effect upon the public health is worthy of very serious consideration, as the relation between any plant and the public health is as dangerous to the safety of investment as flaws in legal title to property. If some citizen or official brings the danger to public health before the public eye, it is quite easy to condemn the particular investment, thereby causing great loss to the company.

The effect on the health of the employees is one which common practice has reduced to fairly uniform control and is a subject which is perhaps as well for the designer to leave to the attention of his company's medical advisers, being advised thoroughly regarding possible hazards and taking special precautions to see that health hazards are properly cared for:

1. Through the proper arrangement of windows and ventilating facilities.
2. Through the provision of adequate fume, gas or dust exhaust systems.
3. Through the installation of adequate vents terminating outside the working room.
4. Through the design of equipment properly arranged that operators can handle poisonous or corrosive substances in a safe manner.

The effect of employees upon one another as regards the health of each individual is largely a question of disposal of excreta, and of intimate contact between individuals. The disposal of excreta should be considered with the same care as the disposal of any other waste and has been reduced to an exact science by the sanitation engineer. There is absolutely no excuse for failure in design from this standpoint.

The intimate contact between employees can perhaps be best handled through the design of proper change rooms and changing facilities. We have installed change houses through the plant and very nearly adjacent to the

places of employment. We insist that employees change their clothing before entering the explosives buildings and remove them when leaving for the day. We would be derelict in our duties to the men if we permitted them to go to their homes wearing clothing which might be saturated with explosives.

Hazards and Insurance

Hazards and Insurance bear a peculiar relation to each other. Both represent items of cost. The cost of insurance is directly proportional to the degree of hazard. Aside from the inherent hazards of a particular industry, type of process, and the intellectual limitation of employees, the designer can control the degree of hazard, and hence the cost of insurance.

This leads to the division of hazards into two classes, namely, the man made and natural. Under the first class, we might set out fire and explosion. Under the second, we can list windstorms, lightning and earthquake. I am advised that 90 per cent of industrial losses come from man-made hazards, and approximately 10 per cent from natural hazards.

The designer can protect in his design against losses from fire:

By fire-resisting construction wherever possible.

By installation of proper automatic sprinkler systems.

By isolating equipment or machinery or ingredients possessing flash fire or spontaneous combustible qualities.

By properly arranging buildings or operations so that as few operators as possible are exposed to fire hazards.

By properly providing good egress facilities in work rooms or assembly rooms where flash fires or where serious steam, fume or gas leaks may occur.

By providing adequate vents or ducts by which dust or other flash fire possibilities may be removed.

The designer may remove explosion hazards:

By adequately designing boilers and pressure containing vessels to comply with the latest approved regulations and recommendations of such committees as the Boiler Code Committee of the A. S. M. E.

By providing suitable safety devices to relieve excessive pressures in boilers, hot water heaters, in air receivers, and in all kinds of chemical apparatus where pressures are used.

By providing safety discs or relief where sudden violent reactions occur.

By proper removal, by duct or other means, of dust from the point where the dust originates.

The posting of "No Smoking," "No Matches," and similar warning signs has been omitted, because I feel this is a matter for the plant operating forces rather than for the designing engineer.

Control is the essence of labor hazard prevention and a design which properly cares for the control of labor and for material, will, in most cases, exhibit the lowest degree of all hazards. The designer protects against natural hazards in his basic structural design, and is influenced largely by geographic locations.

Storage

The storage of raw materials, materials in process, and finished product is as much a part of good plant design as the manufacturing process. The size of storage will depend upon the geographic and economic location of the plant. The kind of storage will depend upon the kind of materials to be stored. Some materials should not be stored in wooden structures while others should not be stored in steel structures. Frequently a combination of the two is necessary. For example, it is inadvisable to store nitrate of soda in wooden buildings. The nitrate of soda will actually impregnate the wood, weakening the structure in about the same manner as dry rot. The impregnated wood is highly combustible and subject to spontaneous combustion.

Proper storage for materials in process must be considered especially from the geographic standpoint. With some materials, it is absolutely essential that some type of humidity control be installed, whereas with others the material may be stored in the open. We have had a peculiar example of storage of materials in process in our mixed acid storage tanks. The mixed acid is nitric and sulphuric acids mixed to proper proportions for nitrating purposes. The nitric acid, being volatile, distils off when the tank is exposed to direct rays of the sun and remains in the tank as a gas until the tank cools off, when it condenses forming weak nitric acid. The globules of weak acid run down the sides of the tank to the surface of the acid where it lays as weak nitric acid and attacks the metal of the tank. As a precaution, we are now installing sunshades all over all mixed acid storage tanks to prevent this.

Storage of Finished Products.—In the explosives industry, the storage of finished product resolves itself into two points: proper distancing and protection against the weather under proper distancing—we mean distance from adjacent plant buildings, from public highways, from public railroads and from buildings of adjoining property owners. Under proper protection from the elements, we can subdivide as to class of structure and type of material to be stored.

We store commercial high explosives in brick magazines properly equipped with ventilators and sand tray where necessary and with adequate bullet-proof doors. The reason for this type of construction is obvious. Black powder in kegs is stored in wooden frame buildings, galvanized iron or zinc covered.

In general, the storage of finished product is one which must be analyzed from the standpoint of the material to be stored, taking into due consideration the geographic location and the economic location.

Drafting and Design

Before any plans for a new plant are made, the plant location should be thoroughly surveyed, co-ordinate lines being run at suitable distances. The distances depend entirely upon the operation of topographic location. A

level ground location quite naturally will not require the intensive study for plant layout that hillside locations will. After the actual survey of the plant location, the designer having in his mind the conception of the plant layout is able to spot several trial locations and analyze each individually until finally a definite location, having the least possible objections to the individual arrangements, can be chosen.

From this time on, the problem becomes one of consultation between departmental specialists, each of whom is qualified to handle the design within his own particular sphere until working drawings are executed.

It is during this phase of the design work that the operation of the safety engineer is of the utmost importance. It is quite expensive and uneconomical to make changes in plans and specifications after the plans and specifications have been drawn. The time to make changes is while the plans are in the embryonic stage.

PREPARING CHEMICAL EXPOSITION DIRECTORY

Students Enroll for Chemistry Course—Exposition Ticket Restrictions—Rayon Exhibition

An industrial directory of exhibitors in the Tenth Exposition of Chemical Industries, which will be held in New York at the Grand Central Palace during the week of September 28 to October 3, is now being compiled. The directory will be arranged according to the numerous consuming groups, listing products and equipment sold to each group by exhibitors. The compilation will cover all chemical process materials and machinery and the industries for which they are available. Under each product or group will be listed the various exhibitors who manufacture the article in question, with any particular information about the individual products of the different manufacturers.

The Chemical Exposition directory will be compiled primarily to help buyers who come to the exposition in search of various materials or equipment. The volume when completed is expected to make several thousand pages, which will preclude its being printed for general distribution to visitors. It will be made up in loose-leaf form and held by the management for consultation when inquiries are received as to sources of supply at the exposition.

About twenty leading American colleges and universities have filed applications for their students of chemistry and chemical engineering to take the one-week course of intensive training in practical technique of chemical engineering to be held in conjunction with the exposition. More than three hundred students are expected to enroll before the closing date. All students of recognized colleges, as well as practising chemical engineers, who desire to brush up on fundamentals are eligible to take the course, which is without cost.

A program of lectures for the course for students is now being made up and will be announced at an early date. Some of the leading authorities on engineering methods, materials and equipment will be among the speakers. Lectures will be held during the morning hours at the Grand Central Palace prior to the official opening of the exposition each day. Tours among the exhibits for practical demonstrations will also be conducted for the students. Examinations will be held at the close of the course, as a number of colleges have designated their intentions of giving their students credit toward their degrees for work done at the Chemical Exposition. Prof. W. T. Read, of the Chemistry Department of Yale University, is in charge of the course.

Two types of tickets will be issued for the Chemical Exposition. General admission tickets, which have been used exclusively at past expositions, will be subject to restrictions, being good only after 6 o'clock in the evening until closing time, 10.30 p. m. each day. Between 12 noon, when the exposition will open daily, and 6 p. m. admission will be by special invitation only.

Cards of special invitation will be issued to all exhibitors at the exposition for distribution to clients and prospects. On these invitations will be printed the name of the firm which issues them, and space will be left for the signature and business connections of the guest. Such invitations will be good for admission at any time from 12 noon until 10.30 p. m.

The Rayon Exhibition

What will perhaps be the most extensive exhibition of rayon, commonly called artificial silk and more properly designated chemical silk, ever shown in America will be displayed at the exposition. The artificial silk industry, through its various manufacturers, is going to prepare a joint exhibit of all phases of rayon manufacture, as well as weaving, finishing and dyeing. Four or five large booths in the exposition will be given over to the educational side of the most widely used fiber ever developed by chemistry. The exhibit will be designed from the technical side for the practical textile man and from the educational side for the layman.

MEXICAN DYESTUFF SITUATION

According to Consul Paul H. Foster, dyestuff consumption in the Monterey district of Mexico is estimated at 75,000 pounds per year, of which about half is sulphur black. He says practically all of the dyes are of German manufacture and the American products, although of equal quality, suffer because of the lack of a technical demonstrator. The colors consumed, with the exception of sulphur black, are distributed over a wide range, chiefly of the direct type.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

President
LOUIS A. OLNEY
Lowell Textile School, Lowell, Mass.

Vice-Presidents
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LOCAL SECTIONS AND THEIR OFFICERS

Northern New England Section—
John F. Bannan, Chairman, M. T. Stevens & Sons Co., North Andover, Mass
A. K. Johnson, Secretary, Lowell Textile School, Lowell, Mass.

Rhode Island Section—
Walter S. Williams, Chairman, Mount Hope Finishing Co., North Dighton, Mass
Albro N. Dana, Secretary, Franklin Process Co., Providence, R. I

New York Section—
Herbert Grandage, Chairman, Clark Thread Company, Newark, N. J.
Daniel P. Knowland, Secretary, Geigy Co., 89 Barclay Street, New York City.

Philadelphia Section—
Elmer C. Bertolet, Chairman, Philadelphia Textile School, Philadelphia, Pa.
Percival Theel, Secretary, Philadelphia Textile School, Philadelphia, Pa.

Southern Section—
Harold M. Chase, Riverside and Dan River Cotton Mills, Danville, Va.
Harry W. Ormand, Secretary, Union Bleachery, Greenville, S. C.

SUMMER OUTING OF NORTHERN NEW ENGLAND SECTION

The Northern New England Section held a most enjoyable outing at the Vesper Country Club, Tyngsboro, Mass., on July 13, 1925. Under ideal weather conditions and with the excellent accommodations at the club, about one hundred members and guests entered wholeheartedly into the entire program. During the afternoon keen interest centered in the golf tournament and tennis matches, horseshoe pitching and modified baseball; and in the evening, in the banquet, in the awarding of the prizes for winners in the sports events and in Dr. Herty's interesting address.

Things began to happen at the Vesper Country Club at two o'clock in the afternoon, when Chairman John Bannan swept through the crowd in Pied Piper style with an open tennis challenge. Immediately the list of players grew to such proportions that the final championship matches were not finished until nearly six o'clock. Interested spectators enjoyed a rare time watching these tennis champs battle.

About 5.45 the bugles "blue" to announce the entrance of the gaily attired baseball gladiators into the arena. A parade immediately started for the baseball field, headed by the chairman of the Outing Committee, Albert Sampson, and his husky assistants, Hugh Christison, Frank McCool, Andrew Fisher and George Stewart, followed by the "Offshades," the "Malachites" and the "Fuchsines" in their bright paper uniforms, and by Cop Hannah and Umpire Joseph Travers. Spectators crowded to the sidelines and brought up in the rear of the procession.

There ensued a heartrending contest, punctured by much pistol shooting on the part of Cop Hannah, which added fire to the atmosphere and steadied the pitchers' nerves sufficiently to face the terrible odds against them. Finally the Malachites and the Fuchsines opposed each other for the final heat (speaking of the humidity). After several extra innings the Malachites were assigned the victory and all marched triumphantly, though disjointedly, to the banquet hall.

The banquet was a refreshing and extremely satisfying experience, drily speaking, and brought endurance to the mark of successfully withstanding a brief business session. At this session the acting treasurer's report was presented and accepted and the report of the Nominating Committee favorably acted upon.

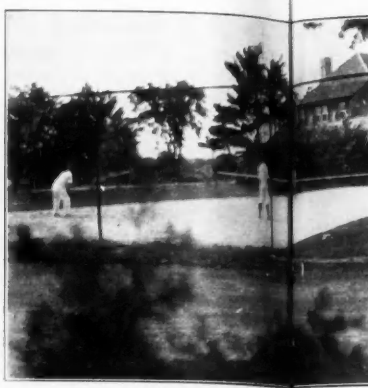
The acting treasurer's report covered the following items:

Receipts

June 11, from Treasurer Miles R. Moffatt (resigned) as his balance in Treasury to date....	$45.82
Contribution from friends, June 13, 1925.....	73.00
Winthrop C. Durfee, treasurer, June 13, 1925..	175.00
Alan A. Claflin, receipts April 18, 1925 meeting; June 17	76.00
Summer Outing Committee, R. C. Smith, golf..	9.00
Total	$378.82

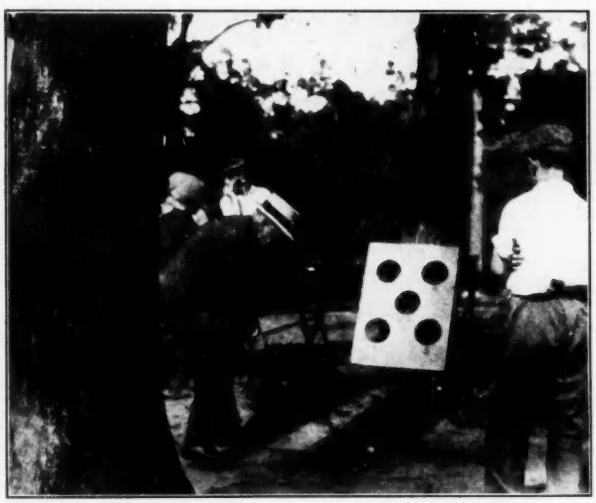
(*Continued on page 532*)

Dr. Charles H. Herty, Winthrop C. Durfee and Prof. L. A. Olney Face the Camera Man at Northern New England Section Outing



The Courts, Vest Country

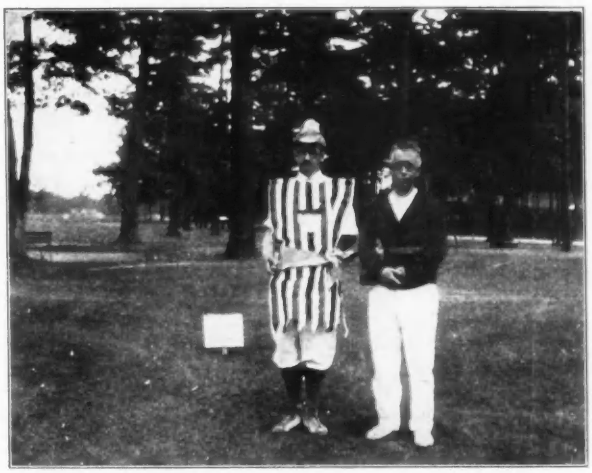
A Ringer! Horseshoe Pitching in the Grove



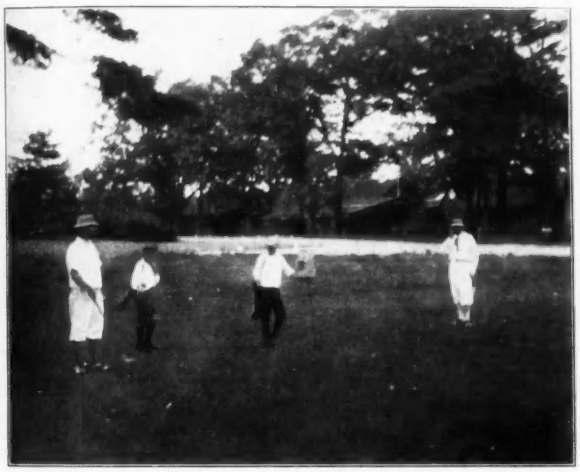
Pot Shot Fans

Albert E. Sampson, Chairman of Outi
John F. Bannan, Chairman, N
England Section

Country Club



Alan A. Claflin and George O. Linberg, Tennis Champions Extraordinary



On the Course with Club and Caddie

of Outing Committee, and Chairman, Northern New England Section

Hugh Christison and C. L. Nutting on Duty at the Polls

Expenditures

Butterfield Printing Co., for September, 1924, printing and stationery	$61.00
Bacon & Kinsman, reporting January and April, 1925, meetings	47.04
Twentieth Century Club, April 18, 1925, meeting	95.00
Clerical expense, April 18th meeting	6.00
Prof. Harold Hibbert, April 18, 1925, expenses and honorarium	78.12
Clerical expense for Summer Outing and Providence meetings	9.08
Total	$296.24
Balance on hand	82.58
Total	$378.82

A. K. JOHNSON, Acting Treasurer.

The following officers were elected on acceptance of the report of the Nominating Committee:

Chairman—John Bannan, M. T. Stevens & Sons Company, North Andover, Mass.

Treasurer—John Russell, U. S. Worsted Company, Lawrence, Mass.

Secretary—Arthur K. Johnson, Lowell Textile School, Lowell, Mass.

Two additional members were elected for the Executive Committee: Harold Leitch, Franklin Mills, Franklin, N. H., and Frank E. Flemming, Goodall Worsted Company, Sanford, Me. These, together with Hugh Christison and George Stewart, whose terms expire next year, constitute the officers for the term 1925-1926. The Nominating Committee consisted of Alan A. Claflin, chairman, H. R. Mork and Winthrop C. Durfee.

At the presentation of the prizes Prof. Louis A. Olney spoke briefly, commending the committee for the great success of the outing due so largely to their efforts. He presented to W. A. Kingman the President's Cup for the member of the section who turned in the best golf score. Mr. Kingman's score was 78. John Bannan presented the Chairman's Cup to the guest with the best golf score, John Linder, whose score was 72. The tennis cups for champions in the doubles were carried away by Alan Claflin and George Linberg.

Chairman Bannan then introduced Dr. Herty whose excellent address brought the outing to a fitting close.

Dr. Herty briefly discussed the working of the present tariff law, saying in part:

"Members of our two associations have a mutual interest in many matters. You are interested in the development and success of our association, and we are interested in your overcoming the difficulties you encounter.

"To speak of a matter of great interest to us, paragraphs 27 and 28 of the tariff law carry possibilities of great harm or great good to the dye industry. The act itself is a skeleton of procedure. Its protective character depends upon its administration by the executive branch and upon decisions of the courts which have been appealed to for interpretation of the regulations. Our association has been placed at a great deal of expense in aiding in the trial of customs court cases. I might say we have won almost 100 per cent of the appeals taken."

He also touched on the graft evil in the dyestuff trade. "The much talked about increase in graft in the sale and purchase of dyestuffs," he said, "is of interest to both of our associations. This form of commercial bribery is absolutely to be condemned both as to the givers and the takers of gratuities. I am confident that if the best elements among the makers and users of dyes handle the situation vigorously and wisely, the condition will be much improved.

"The situation is now slowly improving because of the new type of dyer being turned out by the textile schools. They are sterling young Americans who are well trained. At present there is an insufficient supply of such men coming from the textile schools.

"I feel that in many cases mill chemists have not shown enough backbone in standing up for recognition of the importance of their work, for I know that whenever mill owners have backed up their chemists thoroughly, graft has been eliminated.

"Constant publicity would help. There is no use in our closing our eyes and pretending this evil doesn't exist. We all want to see our industries clean."

In discussing the research problem in the dyestuff and textile industries, Dr. Herty declared:

"The importance of fundamental research in the textile industry cannot be overestimated. The Boyce Thompson Institute for Plant Research at Yonkers, endowed by the generosity of Boyce Thompson, with a competent staff, is engaged in research on fundamental problems, the solution of which will prove of great value to agriculture and horticulture.

"For work of this character the textile industry should contribute directly, for in view of the amount of capital and value of output of the industry, there is a woeful lack of such research. Eventually funds of the Textile Alliance will probably be available for textile research. At present this cannot be, because the Bureau of Internal Revenue has raised the point that more than half of the $2,000,000 fund of the Textile Alliance should be paid to the Government for taxes."

At the conclusion of Dr. Herty's address the Section extended a rising vote of thanks to Dr. Herty, to the Outing Committee, to the AMERICAN DYESTUFF REPORTER and to the Moxie Company for their valuable efforts in making the outing successful.

The Fastness of Colors for Printing Fabrics

All Colors Must Be of Same Fastness—The Mordant Colors—Basic Colors—Improving the Fastness of Malachite Green—Azo Developers—Substantive Colors—Vat Colors

By DR. LUDWIG LICHTENSTEIN

Textilberichte, pages 735-6; 812-4.

Translated by Ismar Ginsberg, B.Sc., Chem. Eng.

IT is a fact that printed fabrics are not employed to so large an extent as dyed textiles where the hangings, dresses, etc., that are made from these goods are required to stand up against exposure to direct sunlight, washing, etc. It is similarly a fact that it is comparatively easy to dye fabrics in fast colors, but it is not a simple matter to print fast shades on fabrics. The styles of the day require a most variegated color effect on printed fabrics and the attention of the textile man in this branch of the industry has been so occupied with developing processes for obtaining these striking color blends on the printed fabric that he has relegated the question of fastness to second place.

Fastness of a color is defined to be its capacity of resisting influences which tend to destroy the color tone and which are met with not only in the actual use of the colored textiles but also in the course of the finishing processes that the colored goods are put through after dyeing or printing. The printed fabrics may be divided into three groups according to fastness requirements. In the first group are the articles that are washed, such as coarse calicoes, apron materials, dress goods for summer wear, underskirts, children's dresses, bedding materials and the like. These goods must be printed with colors that are very fast to washing and to light. The second group consists of upholstery fabrics, and hangings, and in this case the dyestuffs must be fast to light only. In the third group are found very cheap fabrics, such as thin cotton fabrics and flannels which are woven from waste yarn. These fabrics are printed in designs and colors that are in vogue for a single season only and hence do not have to last longer. They are printed with colors not particularly fast either to washing or to light.

All Colors Must Be of Same Fastness

One essential point that must be emphasized in the use of colors to make printing pastes is that all the colors possess the same degree of fastness. It is inadvisable to employ fast shades along with non-fast shades in the printing of fabrics or to use non-fast colors to print the design on a fabric which has been first dyed with a very fast dyestuff.

(The author at this point digresses somewhat to explain the theory of fastness and the methods used to determine how fast a color is toward various influences. He claims to have found a certain parallelity between the size of the particles of a coloring matter and the fastness with which it fixes itself on the textile fiber. He also has something to say on the theory of fastness to light and gives a number of references to journal literature on this phase of the problem.—TRANS.)

The fastness of a coloring matter depends on the depth of the color—the darker the color, the faster it will be—on the character of the fiber on which the dyestuff is fixed and on the nature of the fixation process itself. The individual classes of dyestuffs were examined and several experiments were carried out to determine the fastness of the colors and their applicability in the printing of fast colored designs on textile fabrics.

The tests made included a washing experiment in which the colored fabric was washed in a mixture of two grams of Marseilles soap in one liter of water at a temperature of 40 deg. Cent. for a period of 30 minutes. This was the first test. Then the goods were treated three times as described, and in between the washings they were washed with cold water and dried. The third test consisted of boiling the printed fabrics in a solution made from 5 grams of Marseilles soap and 3 grams of calcined soda in one liter of water. The boiling was carried out at a temperature of 90 deg. Cent. in place of the actual boiling point, and then the goods were washed in a water bath for half an hour and then for another half an hour at a temperature of 40 deg. Cent.

The fourth test consisted in exposing the colored fabrics to the action of sunlight during the months of April and May, one part of the samples being covered with a black cloth. Each week a part of the covered portion was uncovered and exposed, thus gradually increasing the part subjected to the action of sunlight.

The Mordant Colors

In general, the fastness of the mordant colors was found to be satisfactory for textile printing purposes. It must be remembered that this property of the mor-

dant coloring matters does not depend only on the dyestuff itself, but also on the nature of the mordant used with it. For example, the chromium lake obtained with Alizarine Blue is rather fast to light and can be used with good results in the printing of textile fabrics, but the lake formed with the aid of aluminum salts cannot be used because of its poor resistance to light. Turkey Red belongs to the class of most light-fast colors. A fabric which has been dyed with Turkey Red and illuminated with Indigo and Chrome Yellow is particularly fast both to washing and to light. On the other hand, when Berlin Blue is used as the discharge color, the fastness of the latter will not be as great as that of the field. Gallein, gallocyanine and the triphenylmethane dyes that are used with mordants possess a very slight degree of fastness. Logwood Black is fast to light, but less fast to washing, and its combination with Ice Red is particularly lacking in value for this purpose.

The mordant coloring matters are recommended for use in the printing of fabrics that are used for manufacturing upholstery, children's dresses, and bedding materials.

The Basic Coloring Matters

The basic coloring matters play a very important role in the printing of cotton fabrics, for they possess great brilliancy and are easily used. On the other hand, their general fastness is limited. They are used mostly in the direct printing process. The fastness of the basic coloring matters has been investigated very often from a practical standpoint as well as from the theoretical standpoint, and many experiments have been made with the purpose of rendering these colors more fast. Thus, for example, there may be mentioned the tests made with phenols which are added to the coloring matter, particularly with the hydrosulphite discharge. Resorcin has also been used for fixing basic coloring matters. (See Bulletin Muhlhouse, 1901, page 124.)

The author has used a mixture of coloring matter, acetic acid and tannin in the standard manner and another mixture consisting of phenol in the place of the acetic acid. The printed cloth was steamed in a steam boiler in one experiment and in another in a Mather-Platt apparatus, and then both samples were treated with tar emetic. From the results obtained in this experiment it follows that the resorcin color printed with a far greater degree of fastness to light and to washing than the acetic acid color. A capillary experiment was made with the acetic acid solutions of rhodamine and also with the solutions containing phenols. The capillarity of the solutions was determined in a very simple manner by allowing strips of blotting paper or filter paper to dip into them. The results obtained are seen from the following tabulation:

Capillary Experiments

	I.	II.	III.	IV.	V.	Rise
Rhodamine 6 G D extra	0.86	0.86	0.86	0.86	0.86	0.86
Glycocoll		0.71				95
Phenol			0.93			100
Resorcin				1.07		90
Acetic acid, 6 deg. Be.					1.43	185
Made up with water to volume in cubic centimters	1,000	1,000	1,000	1,000	1,000	1,000

The quantity of materials added were in proportion to the weight of the molecule; the extent to which the filter paper strips dipped into the liquid was 12 millimeters, the duration of the action was 12 hours, as at the end of that time no further change took place.

Resorcin and phenol reduced the capillarity of the solution of rhodamine, while acetic acid increased this property of the dye liquor. From the standpoint of the Pelet-Jolivet studies it may be concluded as follows: that resorcin and phenol increase the size of the particles of the dyestuff while acetic acid decreases their size. Acetic acid has, therefore, an actual solvent action on the coloring matter, while phenol and resorcin form a complex compound with the rhodamine in the solution, but the nature of this compound is unknown; that is, whether it is of physical or chemical character. In this case the increase of the size of the particles of the coloring matter connotes an increase in the fastness of the color. Resorcin has a stronger effect than phenol. Pyrocatechin and hydroquinone do not have any influence on the coloring matter. As far as results obtained in printing fabrics with the aid of Katanol are concerned, it may be mentioned that these are more fast to washing than the colors that have been developed with tannin mordants.

Improving the Fastness of Malachite Green

A study has been made on improving the fastness of Malachite Green and it has been found that after-treatment with thiourea, sodium metaphosphate and glucose has a very good effect. Furthermore, treatment with an ammoniacal solution of copper oxide and Turkey Red oil is also advantageous, as well as fixation with the aid of phospho-tungstic acid. The capillarity experiments did not reveal that any change had taken place in the size of the particles of the dyestuff after it had been treated with thiourea and urea.

The basic coloring matters are used in color discharge printing on cheap textiles such as cotton goods and flannels, and unfortunately they are sometimes used as well to print cloth which is used in making furniture covers. Batik has been printed with basic coloring matters which are used with a special oil mordant. In the case of certain fabrics which are

discharged with the aid of tannin mordant a non-fast ground is printed with fast vat dyestuffs. This is not a very advisable procedure, but is satisfactory in the case of colored cloths that are made to last one season only. Basic dyed grounds discharged and printed in colors with dyestuffs that are able to resist the action of hydrosulphites are very good examples of a combination of colors which are all of the same degree of fastness.

Azo Developers

The azo developers are fast to light and to washing as well. The fastness of the coloring depends on the composition and the drying of the preparation, furthermore on the degree of acidity of the diazo liquor, and consequently on the rapidity of the coupling process. The formation of the azo body takes place, or rather should take place, within the internal structure of the fibers, before the naphtholate has diffused over the surface. Ice Red from paranitraniline will meet the requirements demanded in a textile that has to be washed frequently. A much liked and advantageous combination is to print the field with the aid of Aniline Black and then produce a colored design on it with the aid of Ice Red. Logwood Black and basic coloring matters other than Ice Red give combinations of lesser value which are always well suited for printing fancy goods that are intended to last for one season only. Very fine effects are obtained with the aid of hydrosulphite discharge on Iced Red fields, but the fastness of such printed fabrics is not all that might be desired. The red color obtained from paranitro-ortho-anisidine, because of its high price, is used but little in the printing of fabrics, but this color is particularly fast. The colors obtained with the aid of the Naphthol AS developers are known for their fastness.

The color obtained with the aid of Aniline Black is very fast, although it has a tendency to attain a greenish tinge which is not good.

In printing textile fabrics the resist process with Prud-homme Black plays an important role, and the ground is then illuminated with lake colors or with basic dyestuffs. The fastness of such printed fabrics, if they are to have the satisfactory degree of brilliancy, is not very considerable, but it is suitable for certain classes of print goods.

The sulphur coloring matters are used but very little these days in the printing of textile fabrics.

Substantive Coloring Matters

The substantive colors are used mostly for forming the field or ground in the discharge process of printing fabrics. The fastness to light of some of the substantive coloring matters is very satisfactory, as, for example, that of the benzo fast dyestuffs, which belong to this class. This fastness can be increased by after-treatment of the printed fabrics with the aid of metallic salts. The fastness to washing is enhanced by aftertreating the color with formaldehyde. In the dyeing process it is best to use coloring matters that have as high a degree of fastness as possible, but the after-treatment must not be permitted to destroy the brilliancy of the coloring and at least it must not alter the color tone.

Substantive yellow is used to a very large extent in the direct printing process. It would be an interesting problem for research to undertake to increase the fastness of this color. One plant is known to produce an imitation of goods that are printed with a fast rose ground by printing with the aid of Direct Rose. The goods are not even washed once in the mill. This seems to indicate that for certain specific purposes the least fast dyestuffs are apparently fast enough.

The Pigment Coloring Matters

The fastness of the pigment coloring matters depends principally on their dilution and on the substratum as well. Lithol Fast Yellow R is a dyestuff which is very fast to light, but when it is diluted with white lead or baryta white its fastness is very slight. Alizarine lakes behave in the same manner. On the other hand, it has been established that a large number of coloring matters, when mixed with white lead or baryta white, are just as fast as they are by themselves, but when mixed with zinc white they are not fast. This may be explained by the fact that zinc white has the property of absorbing the ultra violet rays, while both white lead and baryta white reflect them.

The Vat Coloring Matters

The vat coloring matters are possessed of a high degree of fastness, but their handling and application is a much more difficult matter than in the case of the mordant coloring matters. Indigo changes, when subjected to the action of both light and water, in an ideal manner, that is, without undergoing any change in color tone. The fastest results with the use of Indigo have been obtained by means of the Haller process.

Likewise Chlorate Red, which is made from paranitro-anisidine, gives a fast color discharge. A fast yellow on the other hand cannot be obtained with the aid of Leucotrope O. Illumination with direct or basic coloring matters is particularly poorly suited for cloth that is to be made into aprons, for these articles are washed weekly. Indanthrene Blue belongs to the fastest of all coloring matters. Cloth, which has been printed by the color discharge process with the aid of paranitro-ortho-anisidine or printed with vat dyestuffs in accordance with the Felmayer process, is very well suited for manufacture into aprons. Alizarine Rose, as the dyestuff for producing the resist field on the fabric, may well be substituted by Hydron Rose. Just

as good results are obtained with one coloring matter as with the other.

Within the past few years the vat coloring matters have been employed for many different dyeing purposes; they have been used to dye fabrics employed in making upholstery for furniture, and others used in making shirts, children's dresses, aprons, and other washable fabrics. At times these fabrics are dyed with mordant dyestuffs or with azo dyes, but the vat coloring matters give the best results of all. In comparison with the basic coloring matters the vat dyestuffs are generally more fast to light and to washing. It must, however, be mentioned that bromo-indigo is not so valuable a coloring matter from this standpoint. It is, however, entirely valueless to print fabrics which have been given a ground color with dyestuffs that are not possessed of approximately the same degree of fastness as the aforementioned coloring matters. For example, it would be foolish to use Hydron Blue and Ice Red in conjunction with Direct Yellow, Basic Green and Logwood Black.

Flavanthrene exhibits an interesting phenomenon in this connection. This coloring matter is not fast when it is used all alone, but it yields a very fast green when employed in conjunction with Indanthrene. When a capillarity investigation is carried out with these coloring matters, it is found that only Flavanthrene is absorbed, and that the addition of Indanthrene to the color bath results in a reduction in the degree of absorption that takes place. It therefore has the effect of increasing the size of the particles of coloring matter in the dye liquor solution. It has been noticed in testing the fastness of Indigo shades produced by using Indigo in different vat liquor compositions that there is no reason to believe that a relationship exists between the fastness of the coloring matter and the size of particles of the coloring matter in the color liquor.

Practical Hints on the Production of Bright Colors on Textile Fabrics

Part XVI

Dyeing Dark Shades Without Salt—Operation of the Plant and Its Advantages—A Special Plant for Topping and Drying—Its Operation and Features

By RAFFAELE SANSONE

Dyeing Dark Shades Without Salt

When dyestuffs cost much less than at present, it was found convenient in some of the large mills to eliminate, whenever possible, the salt additions during the dyeing operations, with the purpose of more easily reutilizing old baths that could not be employed for repeat shades. In such cases, however, the principle was not applicable to dark shades, as most of the direct colors employed for the purpose could not be made to dye beyond a certain intensity with the means then at disposal.

Since then matters have changed, and owing to the high cost of all dyestuffs it is more advantageous to exhaust the baths as much as possible, standing the expense of the salt. There is no doubt, however, that through the use of a suitable plant direct colors could not only be made to dye in deeper shades, but could also be topped with much more basic colors than is at present possible if the goods, after the first dyeing and topping, were dried, redyed and retopped. For accomplishing this a continuous dyeing machine could be modified as shown in Fig. 1.

This shows a rectangular vat, divided in long shallow compartments of slightly larger width than the broadest piece to be dyed, each having an independent circulation for the baths of treatment. Compartment A contains in this instance a solution of a first direct color, compartment B a solution of a first basic color bath, compartment C a solution of a second direct color, and compartment D a solution of a second basic color. Compartments A and C are supplied with a steam heating coil, indicated by S and T, and have pairs of squeezing rollers G and H.

Before compartment A is a high entering mechanism, having several transversal bars with lines in opposite directions, which rub the cloth on both sides, smoothing it of all plaits and a special measuring arrangement, not to be seen in the figure, which indicates on a large clock the yardage passing through, and can be arranged for ringing a bell when the end of the lot being treated is nearing.

At the end of the compartments B and D are placed the double series of drying drums Q and X, the supporting frames of which are joined with upper bars (K). The interior of the drying drums Q and X receives hot air prepared in a separate plant, and also circulated through the heating coils in compartments A and C.

So that the cloth passing on the drying drums utilizes the greater part of the heating surface of the same, each of these has before it a pair of small guide rollers supplied with spreading lines. The cloth makes its way upward in each case of the line of drums on the left and descends on the line of drums on the right. Before the drying cylinders are placed small very light squeeze rollers.

After compartment D are bearings worked by the

same mechanism driving the plant, and supporting a wooden beam where the dyed and topped material is wound. A special arrangement on these bearings rings a gong when a certain yardage of cloth has been wound, attracting the attention of the operators for taking off a filled beam and introducing an empty beam. The working of the bearings is stopped in this instance instantaneously through the movement of a short hand lever.

Compartments A and C have two series of guide rollers placed close to one another, while compartments B and D have two similar pairs of guiding rollers, but which can be placed at a much greater distance from one another, having also an approaching or distancing arrangement like the first pair.

All guide rollers are of specially small dimensions and are placed quite close to one another for utilizing as much as possible the space in the interior of each compartment. For entering the cotton tape required for pulling through the first piece of cloth to be treated, all guide rollers can be approached at the top of each compartment by a special arrangement of the plant, where the operators have no difficulty in threading the same, lowering after this the lower and upper series of guiding rollers to the desired degree.

The driving of the machine is conducted by a series of toothed discs, driven by worms placed on a back shaft, all worked by electric motor, steam engine or gas engine. By turning a small hand wheel at the front or back of the plant the machine can be stopped at any time, even if the driving medium continues. The plant is also supplied with a speed regulator occupying small space, and directly coupled to the driving medium, through which the cotton fabrics being treated can be run through at any desired speed, indicated on a measuring arrangement in yards per minute.

Operation of the Plant

Work on the above plant would be as follows: All upper and lower series of guide rollers are approached, and a cotton tape of sufficient length is entered in the machine, and passed to frame F, through all guide and squeeze rollers in compartments A, B, C, D, and on the two series of drying drums Q and X, letting it hang from the last of the drying drums. Hot air is now produced in a small separate plant, and caused to circulate through the heating coils S and T and the series of drying cylinders.

After the above, all guide rollers are placed in the required position for the treatment of the goods, which are entered by starting the plant and causing the cotton tape to draw through the first piece. If everything has been carefully arranged, the bell arrangement should indicate when the end of this piece is near, so that the next piece may be sewed on. By similar arrangements, even if the operator is engaged in smoothing the cloth of any plaits formed during its passage in compartments A, B, C, D, or on the drying drums Q and X, he can also find time to conduct the sewing-on operations.

The cotton material passes first through the direct color bath in compartment A, where it is dyed in the most intense shade that can be obtained in this bath at the boil; and after being pressed by rollers G, comes in contact with the basic color bath, circulated through very rapidly to avoid uneven effects. Here a certain quantity of the basic color is absorbed, and after the excess of bath has been pressed out, the material is dried by coming in contact with the heated surface of drums Q, while rinsing and descending into a second bath containing the direct color. Here a second coating of the direct dyestuff is deposited over that already present in more or less the same way as

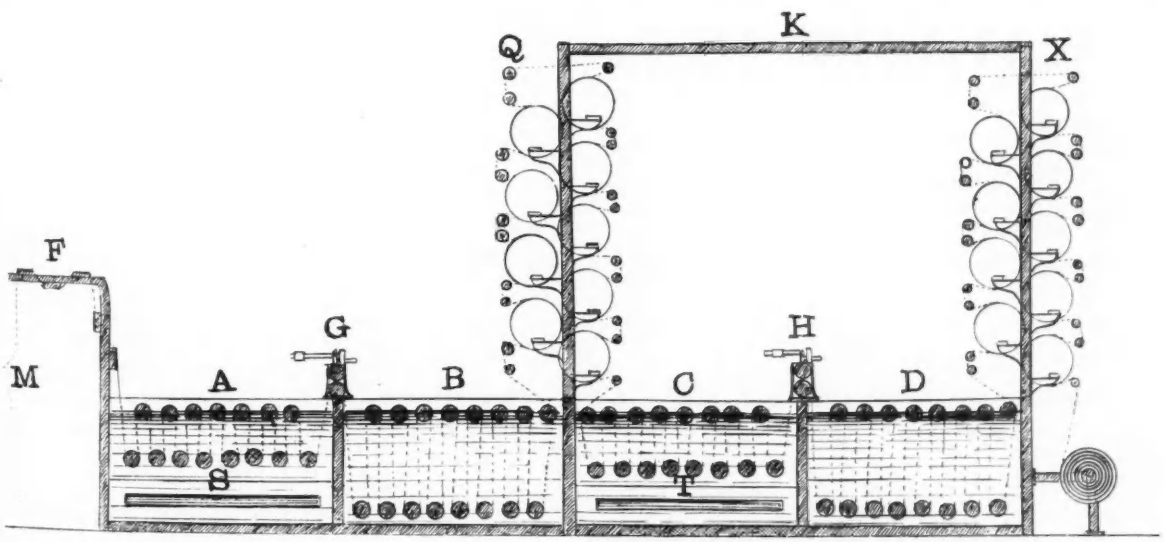


Fig. 1

it would have been from a bath of salt fixing all excess of basic dyestuff present, and producing a much deeper shade. The squeezing cylinders H then drive back into compartment C all excess of bath, and the material only containing a fixed quantity of water and of unfixed dyestuff enters compartment D for fixing further basic color, which greatly enhances the brilliance of the shade produced; so that by the time the cloth rises and descends on drums X it has assumed quite a fine appearance and a shade difficult or impossible of attainment by ordinary dyeing and topping processes.

The cloth is uniformly rolled on the wooden beam placed on the bearings already indicated until a certain yardage has been reached, when the gong rings to attract the attention of the operator, who has then simply to await the end of the last piece being wound on, to rapidly unsew this, to take off the filled beam, placing this on an empty truck at the back of the plant, and to enter in its place an empty beam, on which the balance of the cloth coming from drums T is rapidly wound.

Advantages of the Plant

The above plant offers the following advantages:

1. During one run the cotton fabrics are dyed in just double the intensity of shade that could be obtained on an ordinary continuous machine not employing salt for the exhaustion of the dye baths.

2. In compartments A and C baths of the same or of different direct colors can be employed, and similarly, baths of the same or different basic colors in compartments B and D.

3. The intermediate drying conducted on the series of drums indicated by S can be complete, three-quarters or only one-half, in accordance with the class of good to be produced, by entering the hot air in all, in only three-quarters, or in only one-half of the drying drums.

4. The threading-in of the cotton tape, used for the introduction of the fabrics to be treated, is much simplified by lifting together the lower and upper series of guide rollers in compartments A, B, C, D.

5. The plant not only conducts the dyeing operations, but also delivers the cloth quite dry, ready for the finishing operations, eliminating the intermediate carrying of the goods between the dyeing plant and the drying plant generally necessary.

6. The upright frames supporting the drying cylinders being above the vat of treatment, the space required for the double dyeing and topping operations is much reduced, as is also the requirements of labor, motive power, etc.

7. By the use of hot air in the place of steam, the dyeing operations can be conducted in those mills using this for other purposes, such as for the production of power, aging operations, etc.; or where no steam plants are available, as would be in certain weaving sheds that have not yet applied dyeing processes.

8. The hot air used for the heating can be brought, if required, to above 100 deg. Cent. in compartments A and B, to conduct a very strong boiling of the baths, and even the drying drums can be warmed above this temperature to quicken the treatment of the goods and obtain a larger production.

9. As it is posssible to change the speed at which the cloth is run through the plant, a dye bath containing the direct color and a dye bath containing the basic color, can be used to obtain several gradations or intensities of shade.

10. As it is possible to place the upper and lower series of guiding rollers closer or further to one another, it is possible to increase or reduce the period of contact of the cloth in the baths of treatment, correcting in some cases the action of too strong or too weak a bath.

11. When a mistake has been made in the shade by raising both series of guiding rollers, it is possible to lift the material at once out of contact with the different baths of treatment, correcting these as may be required.

A Special Plant

With the purpose of employing two strong topping baths, and or giving the material an intermediate drying as in the preceding case, the plant shown in Fig. 2 could be employed.

This consists of two special padding machines (G and K), for dyeing in the direct colors required for a ground; two short-bath topping troughs (H and M); and two vertical drying arrangements (R and S). The padding machine indicated by G contains a larger copper-plated iron vat, held in solid side plates that fix it firmly to the flooring of the dyehouse, leaving it at a slight height above the floor to facilitate cleaning operations. The above vat or trough contains a hot air heating coil (s) and a long upper and lower series of binding rollers, through which the cloth (W), entered from a special frame (O) can be delivered for pressing between three upper pressure bowls (A, B, C).

The first and third of such bowls (A and C) are of copper-plated iron, while the central bowl (B) is of iron and has a thick covering of india rubber. Bowl B is of slightly shorter length than bowls A and C, to allow all bath pressed out from the material, between the nip AB, to fall back into the bath just below. The axles or end shafts of the three bowls are held in a slot contained in horizontal side-plates, and on their bearings is applied a certain pressure through the hand-wheels o and p. At the end of padding machine G is placed the leading-out frame P.

Potting trough H is of quite characteristic construction. It is constituted principally of a light iron frame supporting two lower round pockets, having each a glass guiding roller. In the middle of the trough, and so as to remain just above the point of junction of the two

pockets, is a third binding roller, while at its end is a light pair of squeeze rollers (m).

Padding machine K has also its vat sustained through side plates, and has a hot air heating coil (t) and an upper and lower series of binding rollers, leading the material twice between three bowls (D, E, F), furnished with the required pressure through the hand wheels (q and r), and a leading-out frame (Q). At its beginning is a high upright pair of frames supporting the drying arrangement R, composed in this instance of four large copper-plated iron bowls (a, b, c, d) heated by hot air, and furnished in front with pairs of guide rollers that also act as a spreading means for the fabric passing through.

The second potting trough (M) is in everything equal to the first (H), and is supplied with a small pair of squeezing rollers (n), above which is, however, another pair of upright frames supporting the drying arrangement S, composed of the four large drums e, f, g, h, heated by hot air, and having pairs of back binding rollers, also serving for opening out the material and an upper delivery roller.

At the back of the plant are four double walled boilers, also heated through hot air, and serving for the preparation of the baths of treatment, from which these can be delivered through special taps. Below the plant are placed four cement troughs to receive all excess from the baths of the vats of G, H, K, M. These are supplied with small centrifugal pumps for delivering the old baths collected during a day's working to other cisterns, ready for immediate or later employment.

As the quantities of the baths containing the basic colors are small, the boilers for their production are of much smaller dimensions than those used for the direct dyestuffs. The plant for producing the hot air is quite simple and can be heated by benzene, coal gas, petroleum, heavy oil, coal dust, wood or other fuel.

Operation of the Plant

For working the above plant, the operators prepare the quantities of the baths necessary for the lot of goods to be treated, threading a tape through the empty padding machines G and K, the empty potting troughs H and M, and the drying arrangements R and S. When this has been accomplished, they run in the different baths, and when these begin to pour into the lower cement cisterns, start the plant.

The cotton fabrics thus pass first on the opening frame O, descending directly after this into the first direct color bath in padding machine G. Here they run several times up and down on one-half of the binding rollers, and mount around pressure bowl A, entering the nip formed by this and bowl B, and descending again in the bath of treatment that darkens the shade first produced. On leaving the nip between bowls B and C, the material passes to distributing frame P and descends, after being submitted to opening-out or spreading operations, to potting trough H.

In this it comes twice in rapid contact with a limited and often renewed quantity of the basic color bath, being pressed between rollers m, and mounting to drying bowls d, c, b, a, descending, from the roller above the frames supporting the same, into the trough of the second padding machine (K). Here a double impregnation is conducted under the same, or different conditions of temperature, as adopted in the machine indicated by G.

On leaving padding machine K the material is given in potting trough M another rapid double passage through the basic color bath, mounting after another pressing, conducted by rollers n, to the drying cylinders h, g, f, e, and descending from the guide-roller surmounting the same, being carried straight onto the finishing machine or calender. While the above passage of the goods is taking place the baths are being renewed automatically, the

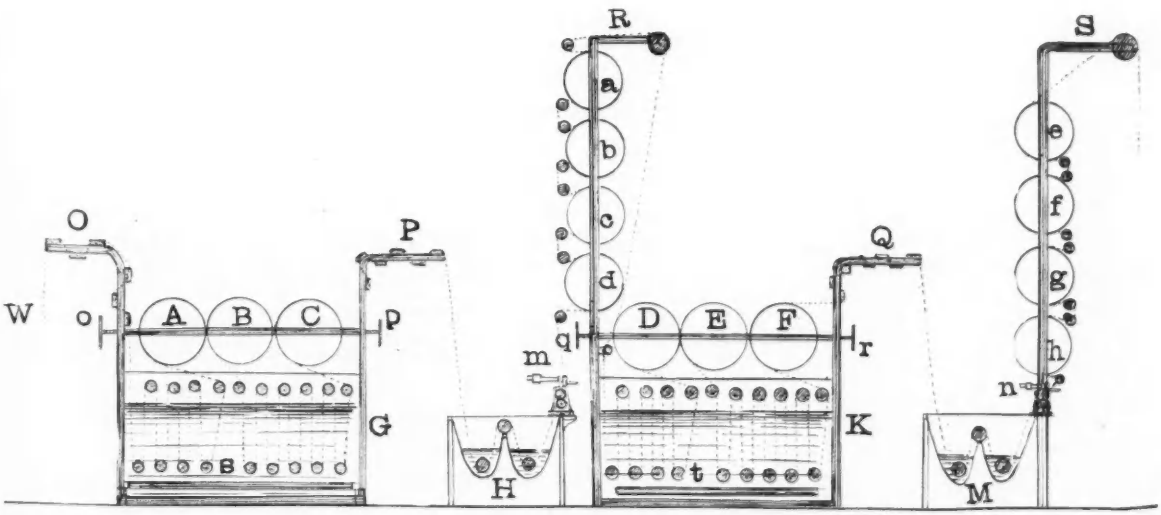


Fig. 2

collection of old baths continuing in the cisterns below the plant.

Advantages of the Plant

The above plant offers several advantages that can be indicated as follows:

1. The topping operations are conducted with very strong baths of the basic color, and these in accordance with the thickness of the material running through the plant, and the rapidity of the treatment can bring about a superficial deposition of the color, a half penetration, or a complete penetration.

2. The troughs of the padding machines being large, and binding rollers numerous and of small dimensions, the dye bath is given a certain time for treating the material, even if the plant is run rapidly to assist the superficial dyeing.

3. The size of the pockets in the potting troughs is just sufficient to permit a rapid impregnation of the material with as little bath as possible.

4. The size of the drying drums can be reduced, rendering the drying arrangements less cumbersome if the air heating them is brought above 100 deg. Cent.

5. The horizontal position of the pressure bowls causes these to act as a sort of cover during the dyeing operations, keeping in a portion of the heat developed just below.

6. To assist the threading-in operations, by a special disposition in the plant these remain at a certain height above the wall of the dyeing trough.

7. Deeper and brighter shades can be produced than are at present possible on any of the usual plants, as the first direct color lake is covered by an excess of the basic color, dried outright on the material, and later fixed in the trough of padding machine K, which adds further direct color, for not only fixing other basic dyestuff, but also allowing an excess of this to remain on the material, increasing its brilliancy.

(To be continued)

NEW NEWPORT BRILLIANT VIOLET

Newport Chemical Works, Inc., has issued a leaflet describing and showing a new product, Newport Direct Brilliant Violet R Conc., said to be useful for the production of bright violet and heliotrope shades on cotton materials having no special fastness requirements. It discharges to a pure white with hydrosulphite, and possesses excellent fastness to steaming and is therefore useful for a ground color in printed patterns. Pure silk may be dyed neutral with this color, producing a bright reddish violet shade, much redder than the shade produced on cotton. Rayon is dyed heavier and a little redder than the shade produced on cotton. Lustron and Celanese are only tinted pinkish. It is not particularly suited for wool. The leaflet gives its application and fastness properties.

SILK CHEMISTS DISCUSS WASHING PRACTICE

Discussion on the establishment of a proper washing practice for silk goods took place at the first meeting of the Committee on Washing Silk Fabrics of the Silk Association of America, held recently at the association offices, 354 Fourth Avenue.

The committee has in mind an educational campaign for the housewife and laundry with regard to washing silk garments—with preliminary study and experiments on the requirements of the definition for "fast color" and "washable silk."

The question is complicated by the varieties of silk, it was pointed out, the printed silk, piece-dyed and skein-dyed silk. A complication from the housewife's and laundry's point of view was brought up in the difference in the chemical contents of water in various parts of the country.

The tests and abuses to which some silks are subjected in washing, the committee agreed, are unreasonable, and no silk fabric should be expected to survive them. In guaranteeing a silk as washable, the manufacturer infers that judicious care will be used in the washing and ironing, and the instruction of the public generally in the proper practice of doing this is the work ahead of the committee. In establishing this practice, the committee is confronted with problems as to the degree the fabric is soiled, the time it should be in the water, temperature of the water, concentration of the soap, mechanical manipulation of the washing process and the heat of the iron. They will also take up the subject of how many times a silk fabric should be expected to wash. Before starting their investigations the committee will consult with chemists, soap manufacturers and laundry men as to the present approved methods in general practice.

Dr W. F. Edwards, of the United States Testing Copany, Inc., was elected chairman. Other members of the committee are Frank D. Cheney, of Cheney Bros.; Harry T. Rounds, of Sussex Print Works; W. R. Thomas, Jr., of Wahnetah Silk Company, and Ernest Cadgene, of Lyons Piece Dye Works.

NATIONAL ANNOUNCES NEW VIOLET

The National Aniline & Chemical Company has issued a leaflet describing the properties and application of National Solantine Violet R, the latest addition to this company's fast-to-light direct colors. It is said to yield bright violet shades of reddish tone, and is described as possessing good solubility and as suitable for use on all types of machines. Either alone or in combination with other Solantine colors, it is claimed, this color is particularly applicable where special light fastness is desired. Swatches attached to the leaflet show this color on cotton, rayon and silk piece goods. Fastness properties and other information are given on the reverse of the leaflet.

AMERICAN DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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AMERICAN DYES ABROAD

ALTHOUGH American dyes are sold all over the world—the export lists show fifty countries that purchase our dyestuffs—our export trade finds its most profitable markets confined to two or three major consuming countries, principally China, Japan and Canada. According to some recent reports, our trade in all three of these countries is losing ground. A comparison of export figures for different periods over the past two years or more, however, does not entirely confirm such a conclusion. While our markets for dyestuffs in the Far East are not now so lucrative as they once were, our exports to this part of the world maintain fairly good proportions in the face of severe competition.

Our dyestuff exports as a whole have in some ways increased remarkably during the past two years. In August, 1923, our total exports of coal-tar colors, dyes and stains were slightly over a million pounds. One year later, in August, 1924, these exports had been doubled; and the latest figures available, those for the month of May, received from the Department of Commerce as we are about to go to press, show only a slight decrease. The exact figures are: August, 1923, 1,008,878 pounds; August, 1924, 2,083,628 pounds; May, 1925, 2,076,516 pounds.

When we total the poundage for the three countries that receive the bulk of our dyestuffs, we are surprised to learn what a high percentage of the total is exported to these countries. Of the total exports of coal-tar colors, dyes and stains for the month of May, given above, China, Japan and Canada received over 80 per cent, or approximately 1,852,000 pounds; with China, our leading consumer as usual, receiving 1,600,000 pounds.

A year ago the German Dye Cartel merged its local dyestuff agencies in China and Japan as the initial step in an intensive drive to regain the dyestuff markets of the Far East. The United States had up until that time been fighting hard to hold the ground it had won, and when news of the merger reached this country not a few so-called foreign trade analysts predicted swift defeat for American dyes in the Oriental markets.

From a closer comparison of export figures it is evident that such predictions were partly right. The Japanese trade has been steadily dropping off. The Chinese market, however, has perceptibly improved. In April, 1924, we exported to Japan approximately 181,200 pounds of coal-tar colors, dyes and stains. In December these exports dropped to 176,600 pounds; and the latest figures, for May of this year, show a further decrease to 97,500 pounds.

China, on the other hand, received only 626,000 pounds of our dyes in April, 1924. The export figures for May, 1925, as quoted above, show a total of 1,600,000 pounds, more than double the quantity exported a year ago. The efforts of Germany and other competitors in this market have not checked the sale of American dyes.

The Canadian market for our dyes fluctuates. In April, 1924, our exports of coal-tar colors to Canada were approximately 124,000 pounds. In December they had dropped to 102,200, and in April, 1925, to 80,900. But the May figures show a considerable increase, with a total of 154,519 pounds. Canada, incidentally, is a good customer for our coal-tar products for she takes some quantity of every item on the list of coal-tar intermediates and finished products, where most of the other countries show blanks in many columns.

The dyestuff export market is bristling with sharp competition and countless merchandising problems. At best the United States can find profitable foreign markets only for its bulk colors, and can market these only after waging price wars against competitors with overwhelming economic advantages. With active markets situated in fifty different countries, the problems are proportionately multiplied. In no two countries are conditions identical.

But the world-conquering spirit of our manufacturers is nowhere exhibited in a more admirable form than in their persistent endeavors to establish their products in the far corners of the earth; and among those who have successfully captured markets abroad there is not one, we believe, who would willingly relinquish the ground he has gained, nor not one who has ceased to strive to extend and strengthen his position. They have the faith in their marketing ability and the faith in their products, and intend to hold on in spite of competition and local problems. May their efforts succeed, and may their knowledge of foreign trade conditions be broadened in proportion!

RECENT LITERATURE

Dyestuffs for Wool. J. R. Geigy Soc. An. Basle, Switzerland. Second edition. 136 pages. Swatches.

The first edition of this excellent volume, we are told in the preface to this new edition, was soon exhausted when it was distributed a few years ago. This we can easily believe, for it is a source of information that no efficient wool dyer would willingly be without.

The various classess of wool colors are exhibited on swatches on the left hand pages of the book. These comprise Geigy's Acid, Erio Fast, Polar, Basic and Chrome colors. By means of marginal index tabs one can turn quickly to the particular section exhibiting the type of dyestuff which one seeks. On the same page with the swatches, in an adjoining column, is information about each color shown. Regarding Acid Violet 6BN, for example, this text says "can be used for compound shades of any description as it dyes level and does not alter in artificial light." On the opposite page is a table showing the fastness properties, etc., of each shade, by a system of numbers in which 1 indicates "poor," 2 "moderate," 3 "fairly good" and so forth. The various dyeing and fastness properties—level dyeing, fastness to washing, acids, etc.—are listed across the top of this numerical table so that complete information is provided in compact form for each shade shown in the book.

The first eight pages of the volume deal with general dyeing instructions and fastness tests that are sure to be of unusual practical value to the wool dyer. Another useful section contains conversion tables of weights and measures employed in the dyehouse.

Fashion shades. J. R. Geigy. Basle.

This shade card displays three shades of each of 32 different fashion colors and contains an index to the dyeing percentages exhibited.

Year Book, American Engineering Standards Committee. 1925. 72 pages.

All interested in industrial standardization will find in this bulletin an interesting detailed compilation of data covering the standardization projects being carried out at present, and considerable general information about the organizations participating in this work and about the procedure employed in fixing standards in any line of industry. The chapters take up in turn, last year's work in brief, industrial standardization, purposes and organization of the American Engineering Standards Committee, methods of work, its membership, its relation to various industrial associations, Government and foreign co-operation, standardization projects, co-operating bodies, constitution and rules of procedure and lists of member-bodies, representatives, committees, etc.

The Commercial Utilization of Corncobs. By O. R. Sweeney. Engineering Experiment Station, Iowa State College. Bulletin 73. 111 pages. Illustrated

This booklet is an extremely thorough compilation and review of the work extant on corncobs and their utilization, and contains data that should be of great interest and value to chemists working on the subject. An introduction gives general information on corncob production and uses and a resume of current studies. The seven main chapters cover Analytical Data on Corncobs; Furfural Production; Oxalic Acid from Corncobs; Destructive Distillation of Corncobs; Sugar and Fermentation Products; Manufacture of Synthetic Plastics; Miscellaneous Products. An extensive bibliography of the literature on the subject is appended. The chapter on furfural production contains a brief mention of the use of furfural in dyestuff manufacture and refers to three publications listed in the bibliography.

BIG CHEMICAL DINNER DURING EXPOSITION WEEK

A chemical industry dinner with twelve hundred in attendance and with General Pershing as the chief speaker is being planned to be held in New York during the week of the Chemical Exposition, September 28 to October 3. The Chemical Warfare Service Association, of which Dr. Charles H. Herty is president, has inaugurated the movement and has sent invitations to other chemical associations to join with the Chemical Warfare Service group in the dinner. Dr. Frederick Zinsser is chairman of the committee in charge.

The early plans of the committee aim to concentrate many of the smaller individual dinners of associations and groups held in New York at the time of the Chemical Exposition into a large reunion of all American chemical interests. It is believed that the Salesmen's Association of the American Chemical Industry, which has held big invitation dinners at previous expositions, the Chemists' Club, the local section of the American Chemical Society and numerous other organizations will join with the Chemical Warfare Service Association in the banquet plans.

Robert E. Fuller, who for a great many years was connected with the New England technical and sales department of the American Dyewood Company, and late of Jennings & Co., has assumed the duties of technical adviser in the Boston sales department of the American Aniline Products, Inc.

Matthew W. Featherstone has accepted the position as overseer of finishing for the Walker Woolen Company, Ashuelot, N. H.

ANNUAL REPORTS OF MEMBERS OF GERMAN DYE CARTEL

The following financial reports of several of the largest units of the I. G. were recently issued by the Department of Commerce, Bureau of Foreign and Domestic Commerce, from information supplied by Trade Commissioner William T. Daugherty, Berlin:

Badische Anilin und Sodafabrik

The annual report of the Badische Anilin und Sodafabrik serves as a model for the reports of all the other members of the Dye Cartel. The entries are grouped together so that no one, even if he be a stockholder, can do anything more than guess as to what is covered in one of these general entries. The gross profits of the Badische are given at 39,080,000 marks (as against 32,400,000 marks in 1913) from which are deducted 8,590,000 marks for general expenditures (1913, 6,010,000 marks), and 15,610,000 marks deducted (1913, 8,260,000 marks), leaving net profits of 14,880,000 marks (1913, 17,170,000 marks.) It is stated that before the gross profits were ascertained, 3,000,000 marks were set aside for the "Jubilee Fund" for welfare purposes in connection with the 60th anniversary of the company. Out of the net profits, a dividend of 8 per cent on the common and 3½ per cent on the preferred stock is to be declared. In 1913, the dividend on the common shares was 12 per cent, and in 1914 it was 19 per cent. No dividend was paid in 1923. Common stock issued in 1913 was of 36,000,000 marks par value as compared with 176,000,000 marks at the present time. The preferred shares, which have been revalued at 1,200,000 marks par value, were issued after the war. The balance sheet shows nothing of the amount received for damages received from the German Government because of the Ruhr occupation.

The report states that it was necessary to conduct business with the greatest caution in 1924, because of the scarcity of capital; that sales of synthetic nitrogen were satisfactory; that sales of fertilizers showed such a heavy increase that a considerably heavier yield of agricultural products in Germany might be expected as compared with previous years; that the manufacture of methanol and butyl alcohol by the new synthetic process had been put on a commercial basis; and that while competition in dyestuffs with foreign countries had increased, results were not unfavorable.

"Agfa," Berlin-Treptow

At the general annual meeting of Aktien Gesellschaft fuer Anilin Fabrikation, Berlin-Treptow, net profits of 5,072 million marks were reported.

The "Agfa" reports that the future outlook of the German Dye Trust is not encouraging, particularly on account of foreign competition in dyes, which was stimulated during and after the war. Not only have other countries developed their own dye industries, but they have erected tariff walls against foreign dyes.

Assurance was given stockholders that, other things being equal, dividends—that for 1924 being 8 per cent—will be sustained in future. It must be remembered in this connection that despite a considerable loss of dyestuffs markets, the I.G. is shifting production progressively to other compensating staples, viz., air-fixed nitrogen, methanol, pharmaceuticals, etc.

"Hoechster Farbwerke," Hoechst/Main

The annual meeting of stockholders of Hoechster Farbwerke Vorm. Meister Lucius & Bruening, Hoechst/Main, discloses little of public interest. The balance sheets were approved and an 8 per cent dividend announced for 1924. The Hoechster works announce a clear profit of 14.709 million gold marks.

Replying to a report as to whether the I. G. had entered into any fusions or mergers with foreign interests, General Director Dr. Haeuser said that this had not been the case. In this connection, whatever American connections have been developed, have been entered into by individual I. G. members, and not by the I. G. as a unit.

"Farbenfabriken vorm. Fried. Bayer"

At the annual meeting of its stockholders, Farbenfabriken vorm. Fried. Bayer, Leverkusen am Rhein, proposed an 8 per cent dividend on 1924 business. Gross earnings were 33,391,694 marks from which general costs, amounting to 8,219,016 marks were deducted and a further 10,190,071 marks was written off. Net earnings then amounted to 14,982,607 marks.

The Bayer Company, like all large industrial enterprises here, was adversely affected by capital shortage. High rates of interest, taxation, reparations deliveries, duties, and export taxes are mentioned as notable handicaps to business. Other factors are: Export sales of dyes are declining against growing foreign competition, stocks had to be accumulated, production to be reduced, and laborers to be discharged.

Griesheim-Elektron, Frankfort/Main

Griesheim-Elektron, Frankfort/Main, publishes its annual report, proposing a dividend of 8 per cent on 1924 business. This report, as others of the trust, is insufficient in detail but gives a broad general outline picture.

Griesheim-Elektron complains of adverse economic conditions, especially at the beginning of 1924, when the sales crisis was at its peak. In a number of products, foreign competition was felt strongly. In order to better meet foreign competition, by reducing production costs, technical apparatus was partly reordered and standardized, while part of this plant's production was removed to the Bitterfeld area, in Central Germany, where cheap lignite is available for power.

Out of gross earnings of 16.27 million marks there remained a net earning of 3.92 million marks. Dividends on common stock required 3.52 millions, the 3½ per cent preference shares called for 11,200 marks; 32,000 marks were assigned to the reserve fund, etc.

The outlook for 1925 is considered uncertain, as much depends upon the conclusion of Germany's commercial treaties. Until the present, however, the Griesheim plants are working at a satisfactory rate, and in instances production has been increased.

NEW NATIONAL SHADE CARD

The National Aniline & Chemical Company has just issued a new shade card, "Basic Dyes for Cotton," showing twenty-one colors dyed on swatch bows, two percentages for each color. A folder attached to the card describes methods of using the colors, covering Mordanting with Tannic Acid, Fixing with Tartar Emetic, and Dyeing; and notes on effects of iron, tannins, standing bath, temperature of mordanting bath, fixing agents, after-treatment, dissolving dyes and discharging.

Dyestuff Tables

A List of the Principal American-Made Colors with Their Properties and Fastness Characteristics

[NOTE: The publishers of The REPORTER have secured more or less complete data in regard to many of the dyestuffs which are at the present time being manufactured in the United States. As the following material has been brought together from various sources, they realize that errors are quite likely to appear, and it is earnestly requested that any readers who find errors or who are able to give additional information will communicate with the publishers in order that this material may be made as correct, complete and up to date as possible. These tables will appear serially until all colors upon which we have data shall have been covered. The publication of this data was begun in the issue of March 10, 1924.]

VIOLAMINE B

(Schultz No. 580)

COMPOSITION: Xanthone.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Glauber salt and sulphuric acid.

SHADE: Bright reddish violet.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: Good.

LEVEL: Dyes level.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Fast.
Alkali: Fast.
Carbonizing: Will not stand carbonizing.
Fulling: Fast when top-chromed.
Light: Good.
Perspiration: Moderate.
Rubbing: Fast.
Sulphur: Moderate.
Washing: Fast when top-chromed.

SENSITIVE TO METALS, LIME: Sensitive to iron and copper.

OTHER PROPERTIES: Used for shading Chromate Brown EB.

DYED BY OTHER METHODS: Dyes wool well in neutral bath. Used for shading Alizarine Blue Black B when used for men's wear navies.

ON OTHER MATERIALS: Silk: Dyes with boiled-off liquor and acetic acid. After-treated with tannin, faster to washing. The fastness to light on silk is excellent. The color is also fast to perspiration and does not crock on this fiber.

PRINTING: Suitable for vigoureux printing.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., under name of Violamine B.

VIOLAMINE R

(Schultz No. 582)

COMPOSITION: Xanthone.

SPECIALLY SUITABLE FOR: Wool and silk.

SHADE: Very much redder than S-580.

FASTNESS TO:

(Properties the same as S-580.)

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., under name of Violamine R.

EOSINE

(Schultz No. 587)

COMPOSITION: Phthalic anhydride.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: With Glauber salt and acetic acid.

SHADE: Salmon pink.

SHADE BY GASLIGHT: No change.

SOLUBILITY: Good.

LEVEL: Dyes level.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Goes yellower with sulphuric acid.
Alkali: Fast.
Chlorine: Fairly fast.
Fulling: Moderate; bleeds into whites.
Ironing: Temporarily redder.

Light: Moderate.
Perspiration: Fast.
Rubbing: Crocks somewhat.
Sulphur: Good.

SENSITIVE TO METALS, LIME: Copper makes shade duller.

DYED BY OTHER METHODS: In dyeing with sulphuric acid, the shade comes out considerably duller.

ON OTHER MATERIALS: Silk: The color is not fast to water. Cotton: With addition of alum dyed at a lukewarm temperature, clear shades are produced. They cannot be rinsed, however.

COMPETING PRODUCTS: Made in the United States by Newport Chemical Works, under names of Eosine B and Y; N. Y. Color & Chemical Company, under names of Eosine B-EG-J and XX; American Aniline Products, Inc., under names of Eosine B and Y.

PHLOXINE B
(Schultz No. 593)

COMPOSITION: Phthalic anhydride.

SPECIALLY SUITABLE FOR: Cotton-wool and silk.

USUAL METHOD OF DYEING: Cotton on a tannin mordant.

SHADE: Bluer than Erythrosine; bluer than Rhodamine B.

SHADE BY GASLIGHT: Yellower.

SOLUBILITY: Very good.

LEVEL: Dyes level.

EXHAUSTS: Not clear.

FASTNESS TO:
Acid: Fast.
Alkali: Fast.
Chlorine: Fugitive.
Cross-Dyeing: Will not stand cross-dyeing.
Fulling: Moderate; bleeds into white.
Light: Very fugitive.
Mercerizing: Poor; will not stand mercerizing.
Perspiration: Will not stand perspiration test.
Rubbing: Fast.
Washing: Moderate.
Water: Moderate; bleeds in water at 104 deg. Cent.

SENSITIVE TO METALS, LIME: Not sensitive.

MACHINE DYEING: Suitable.

OTHER PROPERTIES: Principally used for silk.

ON OTHER MATERIALS: Paper: Used for bright pinks on sized pulps; avoid use of alum or alumina; addition of borax improves the shade. Wool: Fast to sulphur, decanting, washing and perspiration; dyed at the boil with acetic acid. Silk: Dyed with boiled-off liquor and acetic acid.

PRINTING: Suitable for cotton and silk printing.

DISCHARGING: Zinc: Fair; discharge slightly bluish. Tin: Color discharge.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., under name of Phloxine B.

ALIZARINE VIOLET ZBS
(Schultz No. 599)

COMPOSITION: Pyrogallol and phthalic anhydride. Powder is sodium salt.

SPECIALLY SUITABLE FOR: Wool.

USUAL METHOD OF DYEING: Chrome mordant.

SHADE: Redder and duller than Gallocyanine.

SHADE BY GASLIGHT: No change.

SOLUBILITY: Best with ammonia.

LEVEL: Inferior to Gallocyanine. Used on piece dyes.

EXHAUSTS: Well.

FASTNESS TO:
Acid: Fair.
Fulling: Stains white slightly.
Light: Moderate; inferior to the Alizarines and to Gallocyanine.
Perspiration: Fast.
Rubbing: Fast.
Steaming: Fast.
Sulphur: Fairly fast.

OTHER PROPERTIES: Suitable for use in conjunction with Alizarine Blue Black B (S-862) and Chrome Blue Black (S-181) for the production of piece dyed navies for men's wear. Has good body and good covering qualities, and helps develop a full shade. Can be used as a bottom for Indigo. Gives nitric acid test.

ON OTHER MATERIALS: Silk: With alum or chrome mordants, a violet shade; nitrate of iron mordant, a prune shade. Silk with the alum mordant is fast to fulling, water, acids and alkalies. Cotton: Chrome mordant; fast to washing; poor to light.

PRINTING: Cotton: Chrome acetate. Wool: Suitable for vigoureux.

COMPETING PRODUCTS: Made in the United States by Zinsser & Co., under name of Alizarine Violet ZBS.

COERULINE
(Schultz No. 600)

SPECIALLY SUITABLE FOR: Wool dyeing and printing; cotton printing.

USUAL METHOD OF DYEING: With chrome or alumina. Best on a chrome tartar mordant.

SHADE: Yellowish olive green; rather dull shade.

SOLUBILITY: Use a little acetic acid.

LEVEL: Does not dye level on pieces.

(Continued on page 549)

Technical Notes from Foreign Sources

Protecting Wool Against Moth Damage

German Patent No. 402,341 is concerned with a process for protecting wool and other animal fibers from damage by moths. The materials to be protected are treated with compounds which contain the group NH.X:Y. In this group X is nitrogen or carbon and Y nitrogen, carbon, or a ring. Such compounds as ethylidenephenylhydrazone, diazoaminobenzene, triphenylguanidine, phthalic acid, phenylhydrazine and pyrazolone are examples of moth protecting substances. The smallest qualities of these compounds introduced in any way in the article to be protected are said to be effective.

Anomalous Adsorption of Dyes by Wool and Cotton

The anomalous adsorption of basic dyestuffs, such as Night Blue and Victoria Blue by wool fibers is correlated with the observation that has also been made that untreated woolen fiber has a negative electrical charge and wool which has been treated with acid a positive charge when immersed in water. The process of dyeing is regarded as due to adsorption of the dye through a neutralization of the charge on the adsorbent as well as to those unknown forces which are responsible for normal adsorption.

Increasing the concentration of a solution of Night Blue increases its acidity, and since this represses the negative charge on the wool, the latter has a decreasing adsorptive power for the dye. The adsorption of the dyestuffs is therefore dependent on the relative rates of increase and decrease of the adsorption due to normal adsorption and to the electrical charge respectively. In buffered solutions of Night Blue, adsorption increased normally with increase in concentration. (Journal of the Textile Institute, 1925, pages T53-60.)

Dyeing Cellulose Acetate

Vat coloring matters of the anthraquinone series in the unreduced condition, such as Indanthrene, Cibanone, Algol, etc., are rendered soluble and are then used for dyeing threads, fabrics and films which contain cellulose acetate.

For example, one pound of Algol Pink R is thoroughly incorporated with from 9 to 10 pounds of a 50 per cent aqueous sodium sulphoricinoleate solution which has previously been heated to a temperature of 90 deg. Cent., and the heating continued until the requisite degree of solubilization is attained. The resulting mass is diluted with a boiling soap solution, made by dissolving 3 pounds of neutral soap in 8 to 10 gallons of water. A thorough mixture is made with the soap solution, and then this is added to a dye bath which contains from 300 to 500 gallons of soft water. One hundred pounds of cellulose acetate yarn are introduced into the bath and dyed in the usual manner. (British Patent No. 277,183.)

Action of Caustic Soda on Cotton

An investigation of the action of caustic soda on gray, scoured and bleached Sea Island and Egyptian cotton yarns and fabrics with particular regard to the changes produced by such treatment in their ripping strain, shrinkage, iodine absorption and hygroscopic moisture is the subject matter of the article which is published in the Jour. Soc. Dyers and Col., 1925, pages 10-18.

The shrinkage of the fabric was at a maximum when it was mercerized with caustic soda of 20 to 30 deg. Tw., density from 1.1 to 1.5. The ripping strain increased slightly by treatment with a soda solution of 5 deg. Tw., density 1.025, markedly decreasing with lye of 10 deg. Tw. density 1.05, and then continuously increasing up to a lye of 50 deg. Tw., density 1.25.

The loss in ripping strain of fabrics which is produced by bleaching may be recovered by mercerization with caustic soda of 1.25 density, and treatment of the fabric with alkalies affects the weft less than the warp. Both bleached and unbleached cotton yarns have an increased iodine adsorption after mercerization with caustic soda solution of 1.25 density, and the increase is greater than the corresponding increase for gray yarn. In all cases the changes in iodine absorption with various strengths of caustic soda is irregular. The color changes which are observed when the fabric, after mercerization with various strengths of caustic soda, is immersed in solutions of iodine, pressed, and exposed to the air are recorded in detail.

Mercerized cotton yarns and fabrics contain more moisture than the untreated material, and the moisture content increases steadily with increase in the strength of the mercerizing liquid up to a concentration of 50 to 60 deg. Tw. except for a slight decrease at 10 deg. Tw. Scouring decreases the copper number of gray cotton fabric. Mercerization of cotton by means of caustic soda of various strengths has an irregular effect on its copper number. Mercerization decreases that of bleached fabric, but increases that of gray and scoured fabrics.

For further details see Journal of the Society of Dyers and Colourists, 1925, volume 41, pages 10-18.

Resorcinol in Printing Textile Fabrics

The use of resorcinol as a solvent in printing pastes which contain basic coloring matters enables the usual

steaming process to be dispensed with. For example, fast colored effects are obtained when the fabric is printed with a paste which contains basic coloring matters, tannin, resorcinol and a thickening solution. The concentration of the resorcinol in the printing paste is from 30 to 60 grams per kilogram of the paste. After the fabric has been printed in this manner, it is dried and passed through a warm aqueous solution which contains antimony salts. It is then washed and finally dried. The addition of resorcinol to the printing pastes containing rongalite is advantageous for the discharge of ground shades which are obtained with the aid of direct coloring matters. Faster Alizarine Red effects are obtained with resorcinol added to the printing paste, and on non-oiled fabrics the resulting shades are deeper than those which are produced without the addition of resorcinol. The proportion of resorcinol used in the printing paste in this case is from 20 to 40 grams per kilogram of the paste.

For further details see Textilberichte, 1925, pages 106-7.

Dyeing Black on Jackal Furs

The following process permits of the successful dyeing of many South African furs in black shades. Such furs as that of the black-backed jackal, *Canis mesomelas*, are referred to.

The dressed skin is washed in a strong solution of soap and then "fixed" in a bath which contains soda ash to the proportion of 100 grams, ammonium chloride 10 grams, tri-oxymethylene 2 grams, and water 1 liter. The furs are then washed in a solution of acetic acid of one-tenth of one per cent concentration, and then mordanted in a bath which contains 5 grams of copper acetate, 5 c.c. of glacial acetic acid and 1 liter of water. They are then sensitized in a bath which contains 60 grams of sodium acetate, 45 grams of ammonium chloride and 1 liter of water. The furs are then finally dyed in a bath which contains 7 grams of para-phenylenediamine, 1½ grams of meta-phenylenediamine, ¾-gram of para-aminophenol, 20 c.c. of ammonia, of 0.97 density, 90 c.c. of a 3 per cent solution of hydrogen peroxide and 1 liter of water.

The furs are remordanted in a solution of one-tenth of one per cent of a solution of copper acetate and finally washed in a dilute solution of soap. The temperature is maintained throughout the dyeing process at between 25 and 30 deg. Cent. When nearly dry (in the cold) the pelt side of the fur is brushed with a 20 per cent salt solution. "Singed" furs, that is, those in which the curling of the hair-tips occurs when fixing, cannot be satisfactorily dyed. (Journal of the South African Chemical Institute, 1925, pages 28 to 31.)

Dyestuffs of New Type

Coloring matters of a new type are prepared by condensing an orthoformic ester, or a salt of formic acid, or beta-alkyloxyacroleinacetal, with a cyclo-ammonium salt, which contains a reactive methyl group in the alpha position to the nitrogen. According to examples alpha-beta-betatrimethylindolonium methyliodide is condensed with orthoformic ethylester or with sodium formate to yield a red coloring matter. The corresponding coloring matters of the naphthalene series are blue. The methyl iodide of mu-methyl-benzthiazole yields a violet coloring matter, and the corresponding oxazole derivative a yellow dyestuffs. (British Patent No. 232,740.)

Dyeing Fibers and Fabrics

Animal fibers, which have been subjected to treatment with sodium bichromate or the like, in the presence of mineral acids or salt, can be dyed in yellow and brown shades by means of the aromatic meta-diamines. The mono-amines yield shades which are black in color and of a violet or reddish tinge. Thus, when the dyeing is carried out in an acid medium, it is possible to obtain fine black shades on wool, which do not become green, and which are not discharged when the wools thus dyed are immersed in a solution of aniline nitrate and meta-phenylenediamine. The black develops quickly. In order to dye the vegetable fibers it is necessary to mix the acid solution of bichromate with a nitric acid solution of meta-diamine and mono-amine of the aromatic series. The temperature was 40 deg. Cent. (French Patent No. 566,407.)

PRODUCTION OF BENZOL IN GERMANY

Trade Commissioner W. T. Daugherty, Berlin, reports to the Department of Commerce that production of benzol in Germany in 1924 amounted to 154,000 tons, against 109,000 tons in 1923, 212,000 tons in 1922 and 120,000 tons in 1913, according to figures furnished by the Benzol Verband of Bochum, controlling from 80 to 90 per cent of the local production.

Increased production in 1924 compared with 1923 is, of course, explained by the recovery of industry as a result of the relaxation of occupation control, the benzol producers being largely located in the occupied section of Germany. Sales, however, were adversely affected by the customs barrier maintained by occupation authorities until September 10, 1924.

Benjamin Potoker, attorney, of Newark, N. J., has been appointed custodian receiver for Coal Tar Dyes, Inc., Newark, following application made by a creditor with a claim for $234. Liabilities are alleged to be $15,000 and assets $5,000.

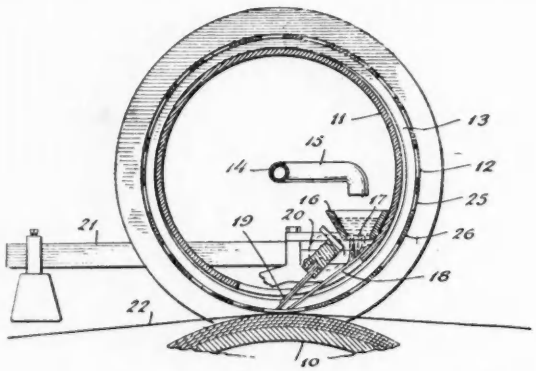
RECENT PATENTS

Method and Apparatus for Printing Textile Fabrics

(1,541,787; June 16, 1925)

Ernest Cadgene, Englewood Cliffs, and George Dupont, Paterson, N. J.

In a textile printing machine, the combination of a pressure roller, an apertured floating stencil capable of contact with roller and being driven thereby, a fo-



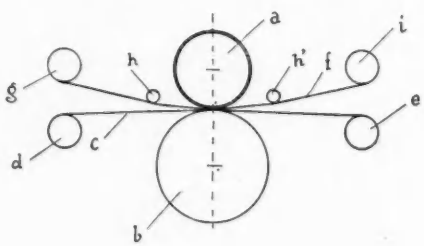
raminated covering for stencil, portions of said covering being coated with an impervious material to form the outlines of the design to be printed, which outlines register with the apertures in said stencil, and the remaining portions of covering being uncoated and forming the figures of design, and means to feed a printing composition through the apertures in stencil to the uncoated portions of covering.

Process for Finishing Textile Materials

(1,542,795; June 16, 1925)

George Gustave Urbain Marie Mairesse, Paris, France.

Process of finishing textiles, leather and other similar material which consists in passing the material between rollers, said rollers comprising an engraved



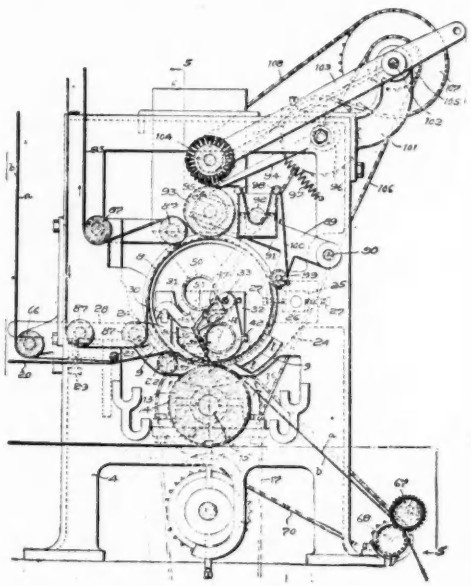
roller and a smooth-surfaced pressure roller, heating said engraved roller, and interposing between the material to be finished and the engraved roller a carrier-sheet coated with a thin layer of a fatty body, so that said fatty layer is pressed against the material as it passes between the rollers.

Machine for Ornamenting Fabrics

(1,541,806; June 16, 1925)

Lorenz Flick, Providence, R. I., assignor to Sayles Finishing Plants, Inc., Saylesville, R. I., a corporation of Rhode Island.

In a machine for ornamenting cloth, the combination of a stenciling cylinder, a container for the orna-



menting material within the cylinder having an inclined wall resting upon the inner surface of the cylinder, means for bodily adjusting the container horizontally within the cylinder to vary its position therein, means for regulating the flow of ornamenting material from the container and delivering it between the inner surface of the cylinder and the inclined wall, and means for rotating the stenciling cylinder.

Process of Obtaining Sulphonated Products of Wool Fat

(1,543,175; June 23, 1925)

Oliver Herzog, Berlin-Dahlem, Germany

The process of obtaining sulphonated products of wool fat, consisting in dissolving wool fat in a volatile solvent, separated from one another the waxy and the liquid fractions of the fat by cooling, and sulphonating these fractions separately.

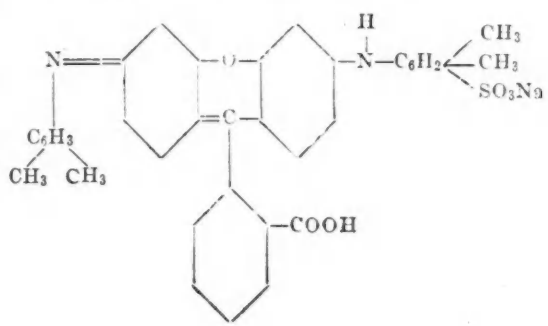
Wool Dye of the Pyrone Series

(1,543,166; June 23, 1925)

Georg Kohres, Leverkusen, near Cologne, Germany, assignor to Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen, near Cologne-on-the-Rhine, Germany.

The new dye of the pyrone series obtainable from fluorescein chloride and vic. meta-xylidine, which is, after being dried and pulverized in the shape of the

sodium salt of its sulphonic acid, a red powder soluble in concentrated sulphuric acid with a scarlet-red coloration having most probably the formula:



and dyeing wool pure yellowish-red shades fast to light, substantially as described.

DYESTUFF TABLES

(Continued from page 545)

FASTNESS TO:
Acid: Fairly fast.
Fulling: Excellent; does not stain white.
Light: Excellent.
Storing: The paste brand does not keep well.

SENSITIVE TO METALS, LIME: Somewhat sensitive to copper.

OTHER PROPERTIES: On heavy material the color does not penetrate well. Can be carbonized after dyeing with sulphuric acid.

DYED BY OTHER METHODS: Can also be dyed acid and top chrome. Chromate not suitable.

ON OTHER MATERIALS: Silk: On either a chrome or alumina mordant.

PRINTING: In printing, the color is fixed with fluoride of chrome and gives shades fast to washing, fulling and light.

DISCHARGING: Can also be printed on cotton with chrome or alumina.

COMPETING PRODUCTS: Made in the United States by Zinsser & Co., under names of Alizarine Green BB and Alizarine Green ZBS.

PHOSPHINE

(Schultz No. 603)

COMPOSITION: Acridine.

SPECIALLY SUITABLE FOR: Cotton and leather.

USUAL METHOD OF DYEING: On a tannin mordant.

SHADE: Yellowish brown.

SOLUBILITY: Acetic aids solubility.

FASTNESS TO:
Washing: Fair topped with tannin.
Sizing: Good topped with tannin.

OTHER PROPERTIES: The Patent Phosphines have a much stronger affinity for leather than those derived from Fuchsine.

ON UNIONS: This color is suitable for printing on cotton-wool silk and cotton-silk unions (tannin, acetic acid).

ON OTHER MATERIALS: The printed shades on silk are very fast to water. Dyed on a tartar emetic mordant, they cannot be discharged with tin salts and are therefore suitable for color discharge work with tin. Zinc dust gives a poor discharge, somewhat yellowish. With oxidizing agents the color is discharged almost white, but the borders are apt to be brownish. It is also adapted for color discharge of Steam Aniline Black, and also suitable for mixing with other products for dyeing tannin padded and discharged material, in which class of work it leaves an excellent white.

COMPETING PRODUCTS: Made in the United States by E. I. du Pont de Nemours & Co., under names of Phosphine G, 2B, G Conc. and 3R; Pharma Chemical Company, under names of Phosphine G, M and 5S; National Aniline & Chemical Company, under names of Phosphine GN and RN.

CHINOLINE YELLOW

(Schultz No. 613)

SPECIALLY SUITABLE FOR: Wool and silk.

USUAL METHOD OF DYEING: On wool, with sulphuric acid and Glauber salt. On silk, with boiled-off liquor and acetic acid.

SHADE: Greenest of the acid yellows.

SHADE BY GASLIGHT: Slightly redder.

SOLUBILITY: Poor for printing; suitable for dyeing.

LEVEL: Dyes level. Can be added at the boil.

EXHAUSTS: Well.

FASTNESS TO:
Acid: Fast to acetic; redder with sulphuric.
Alkali: Fast.
Carbonizing: Fast.
Fulling: Moderate; bleeds into white.
Ironing: Fast.
Light: Moderate; fades greenish.
Rubbing: Fast.
Steaming: Fast.
Sulphur: Fast.
Washing: Moderate.

OTHER PROPERTIES: Special brands for use with weighted silk.

ON UNIONS: Cotton-wool unions: Wool dyes well in a neutral bath. Cotton-effect threads are left clear in an acid bath. Wool-silk unions: With sulphuric acid both fibers are equal.

ON OTHER MATERIALS: Silk: Weighted and unweighted silk with boiled-off liquor and acetic acid. Cotton: With alum and Glauber salt, gives full greenish yellow. Paper: Add to the unsized pulp; good on cellulose and rag; fast to alkali; backwater slightly tinted. Lakes: Use barytes and sodium aluminate and lead nitrate. Jute: Suitable. Leather: Suitable.

DISCHARGING: Not dischargeable with hydrosulphite. Tin and zinc give color discharges.

COMPETING PRODUCTS: Made in the United States by Newport Chemical Works, Inc., under name of Chinoline Yellow; National Aniline & Chemical Company, under name of Quinoline Yellow.

PRICES OF GERMAN DYESTUFFS

The following is a list of actual sales prices per pound ex-factory of German dyestuffs current in April, 1925, as reported by Consul-General F. T. F. Dumont, Frankfort-am-Main:

Hydron Yellow NF Paste (vat)	$0.88
Hydron Orange RF Paste	.95
Hydron Pink FF Paste	.93
Hydron Yellow Olive GG Paste	.78
Hydron Yellow Brown G Paste	.86
Hydron Scarlet BB Paste	1.00
Guinea Light Blue 50 per cent	2.67
Water Blue 70 per cent	1.10
Congo Orange R 95 per cent	1.09
Columbia Red O3B 30 per cent	.67
Fast and Green Extra Bluish Powder	1.04
Triazol Pure Green B Powder	2.05
Grelanone Violet BR Paste	.74
Fur Black DB	.87
Zambesi Pure Blue 4BG	.86
Columbia Catechine G	.91
Fur Brown 4R Paste	1.23
Fur Gray Brown SLA	.87
Fast Scarlet Salt R	.45
Brilliant Milling Blue B	.72
Radio Chrome Green B	1.22
Azonine S 80 per cent	1.35
Azonine BR 100 per cent	.77
Cyanole Silk Blue	2.01
Brilliant Milling Green 100	1.69
Formyl Violet 10B	1.01

Sales prices per pound for certain dyestuffs for export current in May are given below:

Columbia Black WA 42½ per cent	$0.95
Acetopurpurine 106584 12½ per cent	.45
Congo Orange G	1.35
Columbia Yellow	.75
Chrysophenine G	.80
Congo	.60
Chicago Blue	1.00
Direct Navy Blue	.65
Columbia Brown M	.95
Direct Brown 231	.55
Direct Green 41919	.90
Brilliant Congo Violet R	1.00
Columbia Catechine G	.91
Guinea Fast Red BL	.96
Fur Brown SP	.91
Milling Yellow GA	.82
Diphene Blue R	.78
Columbia Violet R	.88
Fur Brown SKC	1.00
Guinea Light Blue A	2.67
Acid Violet 10B	1.01
Azo Orseille BB	1.47
Cyanole Extra	1.07
Diamine Fast Orange ER	.79

PRATT ALUMNI OUTING

Members of the Pratt Institute Chemical Alumni Association will hold their regular outing this year on September 12th at Fuhier's American House, College Point, Long Island. The Outing Committee has announced a very comprehensive program embracing baseball, bowling, quoits and a variety of track events with prizes for the winners. Additional details will appear later. As the Chemical Alumni Association of Pratt Institute numbers among its members many well known in the dyestuff trade, its outing is an annual get-together event of considerable interest to the industry.

DU PONT DE NEMOURS EARNINGS

E. I. du Pont de Nemours & Co. for six months ended June 30, 1925, reports net income of $10,971,732 after expenses, interest, etc., equivalent after debenture dividends to $9.38 a share earned on $95,060,900 outstanding common stock, as compared with $7,610,089, or $5.84 a share in first half of 1924. Profit and loss surplus on June 30th last was $58,314,778, comparing with $55,881,490 on December 31, 1924, and $53,398,414 on June 30, 1924.

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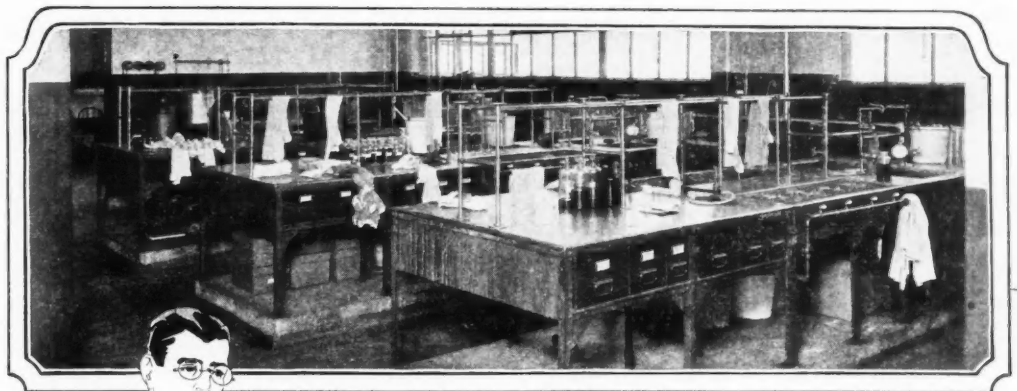

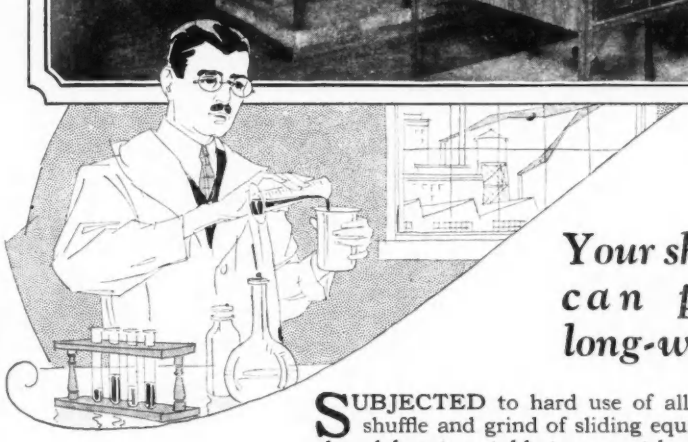

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Monel Metal is strong as steel—tough and wear-resisting. It has no coating to chip, crack or wear off. It endures rough use—it lasts indefinitely.

Monel Metal meets all the requirements of dye house service. It is adaptable to many varied types of textile equipment—from dye tub linings to dye utensils.

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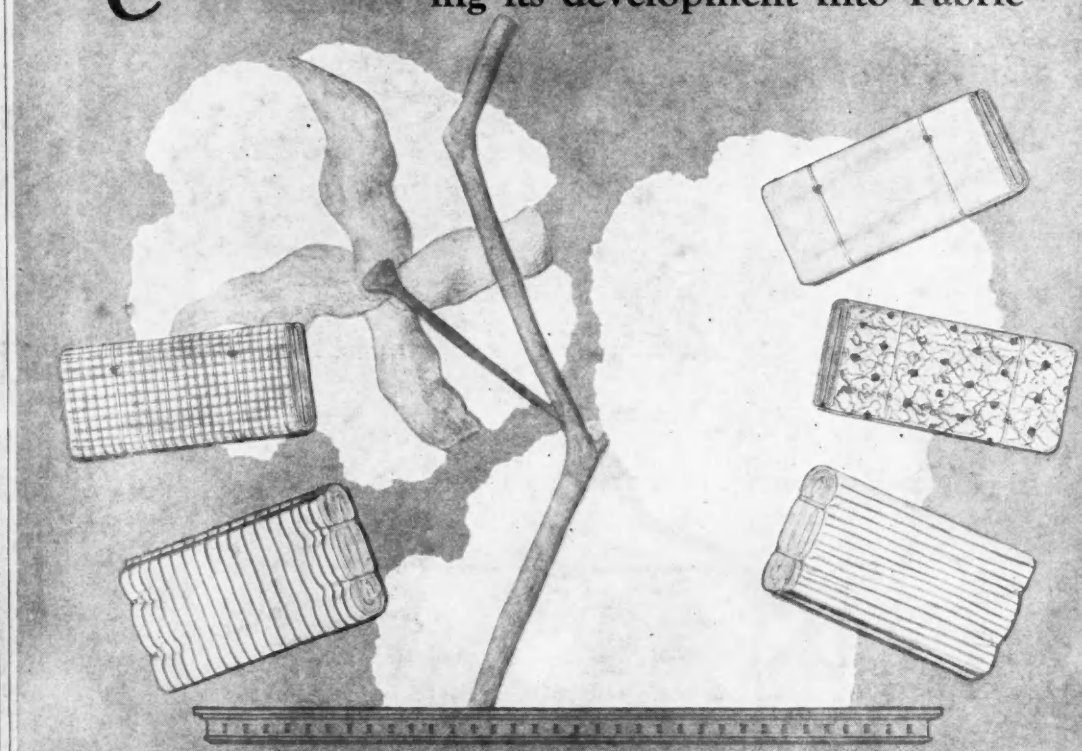

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